HILL
MEMORIAL LIBRARY
LOUISIANA
STATE UNIVERSITY
and
AGRICULTURAL & MECHANICAL
COLLEGE

NEW METHOD
BOOK BINDERY INC.

Digitized by the Internet Archive
in 2015

https://archive.org/details/annualreportofag1896loui

NINTH ANNUAL REPORT

OF THE

State College
of Washington
Library

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. & M. COLLEGE,

FOR 1896.

TO THE GOVERNOR.

BATON ROUGE
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1897.

S8185
5

NINTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. & M. COLLEGE,

FOR 1896.

TO THE GOVERNOR.

BATON ROUGE
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1897.

LOUISIANA STATE UNIVERSITY
LIBRARY

25171
griculture

LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE,
OFFICE OF STATE EXPERIMENT STATION,
Baton Rouge, January 29, 1897.

To His Excellency, Murphy J. Foster, Governor of Louisiana:

SIR—In accordance with the provisions of section 3 of the Act of Congress to establish Agricultural Experiment Stations, in connection with the colleges established in the several States under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the Louisiana Agricultural Experiment Stations, including a statement of the receipts and disbursements from July 1st, 1895, to July 1st, 1896.

STATION NO. 1,

Sugar Experiment Station, Audubon Park, New Orleans. Sugar cane, which constitutes the chief crop of this station, has also been the chief study in the laboratories and sugar house during the past year. In the field, experiments covering the entire subject of proper fertilization of the cane have been continued on the same plats. This is the seventh year that such experiments on same plats with same manures have been conducted, and the combined results have been prepared in bulletin form, and are now ready for publication.

Experiments in different methods of cultivation, drainage and irrigation, have also been continued. Physiological investigations of the sugar cane, both in the field and microscopical laboratory, have been energetically pushed during the year, and valuable results obtained. Among the numerous varieties of cane under trial on the station, are some twenty-five seedlings, several of which have so far shown a high sugar content. Samples of Nos. 95 and 74 of these seedlings have been quite extensively distributed among the planters during the past fall,

1896-1897
329506

and a much larger quantity will be available for distribution next season.

In the sugar house and chemical laboratory, extensive experiments have been made in different methods of clarification and filtration, and the results obtained will soon be available for an interesting bulletin. Prof. W. R. Dodson, Microscopist and Bacteriologist of the stations, spent the entire fall and part of the winter in the study of the physiology of the growing cane, the ferments of the sugar house, and processes of preserving syrups and molasses by sterilization. His valuable work will soon be given to the public. Mr. R. E. Blouin and his assistants, have for the first time, thoroughly studied the composition of cane juices and the changes therein induced by different methods of clarification and evaporation. His results are extremely interesting, and will form the basis of a valuable bulletin soon to be published. The nine-roller mill was used exclusively this year for the extraction of the juice of the cane. The new circular diffusion battery, so generously donated by one of our recent graduates, Mr. S. Eliseo Suarez, of United States of Colombia, South America, was erected in time for use during the season, but the intensely interesting experiments in the various clarifications of the mill juices induced us to continue the use of the mill throughout the season. The past season, while showing a deficiency of rainfall, was never sufficiently dry to require irrigation of the cane. The crop was, therefore, not quite as heavy as the previous one, but was richer in sugar, and the results obtained in the sugar house were about the same each year.

Our young citrus grove continues to grow and increase. During the year, in our nursery, quite a number of varieties of oranges were budded on the sour and trifoliata stock. The hardier varieties, Satsuma and Kumquat, on the trifoliata stock, have proven resistant to the most intense cold ever known in the latitude of New Orleans.

The fibre plants, including varieties of jute, hemp and ramie, were grown in such quantities last season as to induce the trial of new decorticating machines at this station, but none were attracted by them, and to our disappointment, no trials of machines were made.

Alfalfa is still a magnificent success on this station, yielding six to eight heavy cuttings annually. It furnishes green food for stock throughout the entire year, and cures into a hay relished by all farm animals. Red and crimson clovers, Italian rye and Rescue grasses are also successfully grown.

A large number of varieties of corn are grown, including several from Mexico, Brazil, Cuba and Peru. Through the kindness of Gen. Leon Jastremski, United States Consul at Callao, nine varieties of the celebrated Cuzco corns were received and planted. He also sent a quantity of beans and other garden seed.

A large number of varieties of sorghum (saccharine and non-saccharine) and various forage crops, newly imported, were tried to attest their value for stock, with varied success. Several species of Dolichos grew luxuriantly in the field, but failed to produce seed. From plants grown in tubs, a small quantity of seed of each was obtained, which have been reserved for future use. The canaigre, after several years' trial, is found inadapted to our damp soil and climate. The Velvet Bean, tried for first time last year, is very promising. The vines were large and vigorous, and fruit abundant. There was almost an entire absence of fruits of all kinds during the past season.

Since our last report, the Audubon Sugar School, inaugurated and supported by the planters of this State, has been suspended here, and re-established at the Louisiana State University and A. & M. College. It will be conducted along the same lines, and the appliances at this station will be utilized during the fall months for the purpose of giving instruction to the sugar classes, which will be temporarily transferred here during the grinding season.

The suspension of this school made necessary the reduction of force on this station, and accordingly Doctors Wilkinson and Beeson have been compelled to seek employment elsewhere. Mr. R. E. Blouin, formerly assistant chemist of the

State Experiment Station, Baton Rouge, has been made the chief chemist here, and he is assisted by Mr. H. W. Taylor. Mr. E. G. Clarke, who has so faithfully served this station for the last four years as farm manager, accepted a more lucrative position with the recently established Experiment Station of the Hawaiian Sugar Planters' Association, and left us in October last. Dr. R. N. Morgan has been selected as his successor.

STATION NO. 2.

State Experiment Station, Baton Rouge, La., has had only a slight change in the staff. Mr. E. B. Fitts, who succeeded Mr. W. B. Mercier as farm manager, has been recalled to an honorable position in his Alma Mater, "The Storrs Agricultural College of Connecticut," and his place has been filled by Mr. James Clayton, late of the Experiment Station of Texas. Mr. Fitts was employed to test the question of the adaptability of our bluff and alluvial lands to the growing of cigar tobacco, and he remained with us long enough to see his labors crowned with success. The tobacco of last year grown upon the bluff lands has been pronounced of a very superior character, and justifies the positive assertion of the perfect adaptability of the cigar type upon these soils. Through the kindness and courtesy of Mr. L. O. Courseault, who owns and conducts a cigar factory at Convent, St. James parish, a large quantity of this tobacco has been made into cigars, and at the late session of the State Agricultural Society at Baton Rouge, he gratuitously distributed many boxes among the delegates in attendance. The universal verdict of those who tried them was, that they were fully the equal of any domestic cigar, and scarcely inferior to the lower grades of Havanas.

Experiments in cottons, corns and other field crops have been continued. Special attention has been given to the growth of Egyptian cotton on this and both of the other stations, to test whether we can grow this staple and supply the demand of our manufacturers, and keep at home the millions now sent annually to Egypt. Seeds from Dr. T. David, of Zagazig, Egypt, and from Consul General Penfield, of Cairo, were received and planted, and directions given by both followed in the planting and cultivation. The crops have been gathered and await the arrival of a McCarthy roller gin, now en route from England, to be ginned, and the staple forwarded to the Boston manufacturers for use and comparison with that raised in Egypt.

In the Horticultural Department a success has been made in the growing of winter vegetables, especially cucumbers, under glass. Several shipments made to Chicago realized good returns. The orchards and gardens are in good condition, and if one may judge from inquiries for assistance, are growing in popular favor daily. There is quite a demand for new and improved varieties of seed, which is usually supplied.

The veterinarian of the station has during the past season aided in quelling the virulent outbreak of charbon in the alluvial districts of Northeastern Louisiania. He has also been called upon by several Police Juries to exterminate glanders, to which he always responded. The demand for his services seems to be increasing—a gratifying condition testifying to the growing appreciation of science in its application to "Nature's dumb nobility."

The Entomologist has been busy during the past season in studying the life histories of many of our most important insects, and the result of his labors are now ready for the press.

The Botanical Garden has received many valuable additions during the year, and is becoming greatly more attractive. Prof. Dodson, besides the work performed at Audubon Park, to which allusion has already been made, has studied the root tubercules on luminous plants, and his results are embodied in Bulletin No. 46, just issued. Valuable additions have been made to his bacteriological outfit, which he is energetically using in the prosecution of his work.

Since our last report, Mr. J. D. Clark, a graduate of the University, has been appointed assistant chemist of this station, vice Mr. R. E. Blouin, promoted and assigned to Audubon Park. This laboratory continues to meet the numerous demands made upon it by the public.

The State Agricultural Society held, a few days since, its eleventh annual meeting on the University grounds at Baton Rouge. It was conjointly the guest of the Louisiana State University, Louisiana Central Agricultural Association, and city and parish of Baton Rouge. Ten years ago this society was organized on these same grounds, and it seems fitting and proper it should return each decade to the place of its birth.

STATION NO. 3.

North Louisiana Experiment Station, Calhoun, La., has this year been the theatre of many disasters. In common with the entire hill country, this station has entered throes of a drouth early in April, and remained without a refreshing shower until late in September. The results were almost complete destruction of every kind of crop. A few lessons of wisdom were suggested by the comparison of the experiments during the drouth. First, the only crop which made a fair growth and moderate yields was tobacco—a tap rooted plant, of quick growth and maturity. It was planted in April and harvested in July. The stubbles remained dormant until September, when refreshing showers started the suckers, and by careful handling of the same, and a very late frost, a fairly good second crop was obtained. Second. Small crops of corn were made, where previous rotations had filled the soil with humus; while on adjoining plats, without vegetable matter, scarcely a grain was found. Tap-rooted, quick maturing plants show their superior drouth resisting powers, and the presence of humus in the soil increased the yield of each crop many fold. By a systematic rotation, whereby an accumulation of vegetable matter in the soil may be obtained, an insurance even against extreme drouths may be effected.

The severity of this drouth has never, within man's recollection, been equalled. Some idea of its intensity may be obtained from the statement, that everything made on the station was consumed by the stock early in September, when usually enough is made to last the entire year. Of course all experiments were vitiated.

The drouth affliction was great; but the station has suffered from other afflictions of a more serious nature. Major J. G. Lee, who has been the able and efficient local Director since the establishment of the station, was promoted to the position of Commissioner of Agriculture and Immigration. This was a great blow to the station, and while thousands of his friends rejoice with him in his well merited promotion, legions of the friends of the station unite with us in bemoaning his loss to North Louisiana. His place has been filled by Mr. D. C. Sutton, a graduate of the State University, and formerly Assistant Director of the United States Experiment Station in Florida.

Mr. M. Bird, who has so long served the station as chemist, has been compelled from family affliction, to resign his position. Mr. Baynard Turpin, a graduate of the State University, has been appointed in his place.

The dairy at this station, which has been so successfully inaugurated and conducted, received a severe blow a few months since by the discovery in its herd of a young Jersey cow well advanced with "Tuberculosis." It is believed that this disease was caught from our late tobacconist, Mr. W. F. Clarke, whose death from consumption was chronicled in the last report of the station. A resort to the Tuberculin test, revealed the startling fact that seven of the herd were more or less suffering from this disease. By order of the verterinary surgeons, a quarantine of the infected cattle was established, and subsequently a further test was made with Tuberculin upon the entire herd. Finding seven animals hopelessly in quarantine, it was deemed best to dispose of five of them, which was quickly done, leaving two most valuable cows of the purest and best strains, from which we hope to breed without endangering the |offspring or rest of the herd. Full particulars of this outbreak was given in Bulletin No. 44.

The station has recently added to the number of its swine and poultry, a pair of registered Poland Chinas, and several trios of valuable chickens have been recently bought.

Despite the drouth and its desponding tendencies, a large crowd attended the fourth annual Fair and Camp-meeting held last September at the station. The exhibits both of stock and farm products were good, though inferior to those of 1895.

The North Louisiana Agricultural Society still holds its regular meetings at the station, with usually large attendance and beneficial results.

The following Bulletins have been issued during the year:

Bulletin No. 40, The Cow Pea; origin, botanical relations, chemical composition, feeding value, restorative virtues to the soil, etc.

Bulletin No. 41, Tobacco; yellow leaf and cigar variety.

Bulletin No. 42, Horticulture; results of the year 1895.

Bulletin No. 43, Bovine tuberculosis in North Louisiana.

Bulletin No. 44, Charbon or Anthrax.

Bulletin No. 45, Commercial Fertilizers.

Special Bulletin, Geology and Agriculture, Part III.

The following constitutes the staff of the stations:

SUGAR EXPERIMENT STATION NO. 1.

Post Office, Audubon Park, New Orleans, La.

Wm. C. Stubbs, A. M., Ph. D., Director.
R. E. Blouin, M. S., Chemist.
H. W. Taylor, B. S., Chemist.
R. T. Burwell, M. E., Mechanical Engineer.
T. C. Glynn, Sugar Maker.
R. N. Morgan, B. S. A., V. S., Farm Manager.
E. S. Matthews, B. S., Soil Physicist.
Jas. K. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION NO. 2.

Post Office, Baton Rouge, La.

Wm. C. Stubbs, A. M., Ph. D., Director.

D. N. Barrow, B. S.; Assistant Director.
H. Skolfield, Treasurer.
Chas. E. Coates, Jr., Ph. D., Chemist.
J. D. Clark, B. S., Assistant Chemist.
W. W. Clendenin, A. M., Geologist.
W. R. Dodson, A. M., Botanist.
S. B. Staples, D. V. S., and B. S., Veterinarian.
H. A. Morgan, B. S. A., Entomologist.
F. H. Burnette, Horticulturist.
James Clayton, Farm Manager.

NORTH LOUISIANA EXPERIMENT STATION NO. 3.

Post Office, Calhoun, La.

Wm. C. Stubbs, A. M., Ph. D., Director.
D. C. Sutton, B. S., Assistant Director.
Baynard Turpin, B. S., Chemist.
Ivy Watson, Farm Manager.
Gene Watson, Horticulturist.
Geo. Steil, Dairyman.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year, ending June 30, 1896. It shows expenditures have equalled the receipts.

Respectfully submitted.

WM. C. STUBBS,
Director.

Statement of receipts and expenditures of the Louisiana

Agricultural Experiment Station, in account with the United States Appropriation.

1896.	Cr.	Dr.
The receipts from the Treasurer of the United States for the year ending July 1st, 1896......		$ 15,000.00
By salaries..	$ 7,944.10	
By labor..	1,789.98	
By publications..	1,759.62	
By postage and stationery........................	360.05	
By freight and express........................	410.58	
By heat, light and water........................	213.71	
By chemical supplies........................	947.18	
By seeds, plants and sundry supplies............	160.39	
By fertilizers..	168.94	
By feeding stuffs..	247.27	
By library..	187.71	
By tools, implements and machinery............	351.90	
By furniture and fixtures........................	101.10	
By scientific apparatus........................	97.47	
By live stock..	260.00	
	$15,000.00	$15,000.00

We, the undersigned members of the Bureau of Agriculture, to whom is entrusted the disbursements of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30, 1896, and have found the above classification to be correct, and that the receipts for the time named are shown to be $15,000.00, and that the corresponding disbursements are $15,000.00, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed) J. G. LEE,
Commissioner of Agriculture.
WM. GARIG,
Vice President of Supervisors and ex-officio member of Bureau of Agriculture.

I hereby certify that the foregoing statement is a correct copy from the books of the Louisiana Agricultural Experiment Station.

(Signed,) H. SKOLFIELD, Treasurer.

TENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. & M. COLLEGE,

FOR 1897.

TO THE GOVERNOR.

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1898.

TENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. & M. COLLEGE,

FOR 1897.

TO THE GOVERNOR.

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1898.

Louisiana State University and A. and M. College,
Office of State Experiment Station,
Baton Rouge, La., January 24, 1898.

To His Excellency, Murphy J. Foster, Governor of Louisiana:

Sir—In accordance with the provisions of Section 3 of the Act of Congress to establish Agricultural Experiment Stations in connection with the colleges established in the several States under the provisions of an Act approved July 2d, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations, including a statement of the receipts and disbursements from July 1st, 1896 to July 1st, 1897.

STATION NO 1.

Sugar Experiment Station, Audubon Park, New Orleans, has continued the series of experiments in the field, laboratory and sugar house with sugar canes hitherto reported. In the field trials with seedlings, *i. e.*, varieties of canes grown from the pure seed of the cane, several have proven good both in tonnage and sugar content. One of them is deserving of special mention. No. 74. It has now been tested for four years, and this year the results have been such as to justify the Station in distributing small quantities of it among the planters of the State. It has yielded over forty tons per acre, and with a mill extraction of 78 per cent., its juices had a density of 18 degrees, Brix, and polarized nearly 17 per cent. sucrose.

It has been planted largely this year, with a view of a more extended distribution among the planters next fall.

In the sugar house several pieces of new machinery have been tested. The new circular diffusion battery, with its complete system of hydraulics, works admirably. This was a gift from one of the recent students of the Audubon Sugar School, Mr. S. E. Suarez, Cucuta, United States of Colombia, South America.

The chemistry of the sugar cane, and the changes produced by the different methods of clarification, have been continued from last year in the laboratory and a bulletin covering the results of such investigations will be soon issued by this Station.

The citrus grove replanted after the severe freeze of 1894-'95, bore for the first time this year a small quantity of fruit. Over seventy-five varieties of oranges and pomelos have been secured, and buds from any variety are cheerfully given to every grower of oranges in this State.

The alfalfa crop upon this Station is a marvelous success. From a two acre cut, planted in October, 1895, sixteen cuttings have been made to date, and the stand is still good and plants vigorous. Patches sown in the fall of 1896 to 1897 are also equally as luxuriant.

It should be seeded in this latitude in October, and at the rate of a bushel to five or six acres. The hay from the cuttings made in the summer readily sold for $15 per ton.

The Velvet Bean (Dolichos multiflorus) has been successfully grown on all three of the stations. It is an immense viner and produces the largest quantity of forage of any plant known. It also gives, late in the season, a goodly yield of pods. As an improver of soil, it must rank in the first class of leguminous plants. A quantity of seed was last year distributed over the State, and this year a much larger supply is available for the same purpose.

Red and crimson clovers have also done well on this station.

STATION NO. 2.

State Experiment Station, Baton Rouge, La., has harvested another excellent crop of cigar tobacco. The previous crops, after being properly cased, have been made into cigars and distributed through middle Louisiana. The praise accorded by those who have smoked them, together with the testimony of the manufacturers, clearly substantiate the claim already made, that middle Louisiana can grow profitable crops of cigar tabacco. The crops generally upon this station were fairly good, while the small grain and clover yields were very good.

The Horticultural Department has received many valuable additions to its orchard and gardens. In the latter, as also at Calhoun and Audubon Park, careful experiments have been made to test home-grown seed of nearly all kinds of vegetables against those grown in the North and East. It is gratifying to note that in nearly every instance the former has proven the equal, and frequently the superior of the latter. This is encouraging to Southern seed growers, and if abundantly proven by future experiments, will greatly extend the seed growing industry in the South. Bulletin on Horticultural Results, now being prepared for the press, will give the detailed results.

Prof. W. R. Dodson has greatly increased the number of plants in the Botanical Garden, by purchase and exchange. He has also conducted for several years a series of experiments looking to the solution of the presence of red rice in our rice fields, and how to eradicate it, and his results are contained in a bulletin now in press.

Under Act 129 of 1894, Prof. H. A. Morgan has been called upon several times to inspect and disinfect fruit trees and plants brought from other countries. Recently some orange trees badly infected with scale have been introduced from Florida, and arrangements are now being made to have them thoroughly cleansed or destroyed.

In the spring, nine head of Western cattle were imported from St. Louis, and experiments instituted with them for studying carefully the Southern cattle fever and the various methods of rendering imported cattle immune.

Simultaneously, Prof. Morgan has studied the life history of the Southern cattle tick, the vehicle for transmitting the disease. While the results have been by no means conclusive, yet the investigations have been productive of valuable information and suggestions for future work. These investigations have been made by Profs. Dodson and Morgan and Drs. Staples and Dalrymple.

STATION NO. 3.

North Louisiana Experiment Station, Calhoun, has had a very fair season, and therefore good crops. Red and crimson clovers and alfalfa have during the past year done well, yielding large and profitable crops. The small grains, after furnishing luxuriant pasturages through the winter to all kinds of stock, made bountiful harvests, and have impressed upon all observant farmers the necessity of growing these crops through the winter, and the certainty of abundant harvests if they be sown at the right time and in the right manner.

The yellow leaf tobacco is still successfully grown on this station. Prospects are good for the establishment at an early day of a factory for the manufacture of plug and smoking tobacco at Monroe. If this be done, quite a stimulus will be given to this new industry in North Louisiana.

Both the dairy and the poultry yards continue to receive popular attention from the farmers and their wives.

The camp meeting and fair held last September at this station was very largely attended. The exhibits were numerous and excellent. A large premium list provided by the Police Juries of several parishes stimulated exhibitors to strong competition.

The following bulletins have been issued during the year:

Bulletin No. 46, Leguminous root tubercles.

Bulletin No. 47, Results of experiments at State Experiment Station, Baton Rouge, in corn, cotton, forage crops, etc.

Bulletin No. 48, Report of the Entomologist.

Bulletin No. 49, Commercial Fertilizers.

Bulletin No. 50, Red Rice.

Special Bulletin, Geology and Agriculture, Part IV.

Besides the above, the Director has prepared a book of 200 pages on the Sugar Cane, giving its history, botany and agriculture, which has been distributed among all interested in sugar growing in this State.

The following constitute the present staff of the stations:

SUGAR EXPERIMENT STATION NO. 1.

Posotffice, Audubon Park, New Orleans, La.

Wm. C. Stubbs, A. M., Ph. D., Director.

R. E. Blouin, M. S., Assistant Director and Chemist.
H. W. Taylor, B. S., Chemist.
C. C. Krumbhaar, Mechanical Engineer.
Geo. Chiquelin, Sugar Maker.
W. D. Clayton, B. S., Farm Manager.
E. S. Matthews, B. S., Soil Physicist.
Jas. K. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION NO. 2.

Postoffice, Baton Rouge, La.

Wm. C. Stubbs, A. M., Ph. D., Director.
D. N. Barrow, B. S., Assistant Director.
H. Skolfield, Treasurer.
Chas. E. Coates, Jr., Ph. D., Chemist.
J. F. Harp, B. S., Assistant Chemist.
W. W. Clendenin, A. M., Geologist.
W. R. Dodson, A. M., Botanist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
F. H. Burnette, Horticulturist.
James Clayton, Farm Manager.

NORTH LOUISIANA EXPERIMENT STATION NO. 3.

Postoffice, Calhoun, La.

Wm. C. Stubbs, A. M., Ph. D., Director.
D. C. Sutton, B. S., Asst. Director.
Baynard Turpin, B. S., Chemist.
Ivy Watson, Farm Manager.
Gene Watson, Horticulturist.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30th, 1897. It shows expenditures have equalled the receipts.

Respectfully submitted,
WM. C. STUBBS,
Director.

Statement of receipts and expenditures of the Louisiana Agricultural Experiment Station, in account with the United States Appropriation:

1897.	Cr.	Dr.
The receipts from the Treasurer of the United States for the year ending July 1st, 1897......		$15,000.00
By salaries....................................	$ 8,461.58	
Labor	2,267.34	
Publications....................................	473.40	
Postage and stationery..........................	291.41	
Freight and express.............................	325.41	
Heat, light and water...........................	188.76	
Chemical supplies...............................	368.96	
Seeds, plants and sundry supplies...............	418.97	
Fertilizers	178.56	
Feeding stuffs..................................	295.86	
Library	157.01	
Tools, implements and machinery.................	675.47	
Scientific apparatus............................	497.95	
Live stock......................................	399.32	
	$15,000.00	$15,000.00

We, the undersigned members of the Bureau of Agriculture, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30th, 1897, and have found the above classification to be correct, and that the receipts for the time named are shown to be $15,000, and that the corresponding disbursements are $15,000, for all of which the proper vouchers are on file, and have been examined by us and found correct.

J. G. LEE,
Commissioner of Agriculture.
WM. GARIG,
Vice President of Supervisors and ex-Officio
Member of Bureau of Agriculture.

LIST OF PUBLICATIONS.

FIRST SERIES.

*Bulletin No. 1, Organization of Sugar Exeriment Station.
*Bulletin No. 2, Manurial requirements of soil.

*Bulletin No. 3, Experiments with various crops.
*Bulletin No. 4, Results of experiments with oats.
*Bulletin No. 5, Results of experiments with sorghum.
*Bulletin No. 6, Results of experiments with corn.
*Bulletin No. 7, Field experiments with sugar cane.
Bulletin No. 8, Experiments with cotton.
*Bulletin No. 9, Analyses and valuation of fertilizers.
*Bulletin No. 10, Sugar house and laboratory work in 1886.
*Bulletin No. 11, Experiments in oats.
Bulletin No. 12, Experiments in sorghum.
Bulletin No. 13, Cotton and its products.
*Bulletin No. 14, Sugar cane (field experiments).
Bulletin No. 15, Rice.
Bulletin No. 16, Potatoes, tomatoes, peas and small grains.
Bulletin No. 17, Ensilage.
*Bulletin No. 18, Analyses of Commercial Fertilizers.
Bulletin No. 19, Sorghum, field, laboratory and sugar house results; diffusion process.
Bulletin No. 20, Sugar cane (field experiments).
Bulletin No. 21, Report of State Experiment Station, Baton Rouge, 1888.
Bulletin No. 22, Report of North Louisiana Experiment Station, Calhoun, 1888.
Bulletin No. 23, Sugar cane, laboratory and sugar house results.
Bulletin No. 24, Rice and its by-products.
Bulletin No. 25, Analyses of Commercial Fertilizers.
Bulletin No. 26, Report of State Experiment Station, Baton Rouge, 1889.
*Bulletin No. 27, Report of North Louisiana Experiment Station, Calhoun, 1889.
*Bulletin No. 28, Report of Sugar Experiment Station, 1889.

SECOND SERIES.

*Bulletin No. 1, Commercial Fertilizers.
Bulletin No. 2, Texas screw worm.

Bulletin No. 3, Report of Horticultural Department for Baton Rouge and Calhoun Stations.

Bulletin No. 4, Irish potatoes; results at three stations.

Bulletin No. 5, Sugar making on a small scale (reprint with additions).

Bulletin No. 6, Sugar cane (field experiments, 1890).

Bulletin No. 7, Report of State Experiment Station, Baton Rouge.

Bulletin No. 8, Results of North Louisiana Experiment Station, Calhoun.

Bulletin No. 9, Sugar cane borer and its parasite.

*Bulletin No. 10, Systematic feeding of work stock.

Bulletin No. 11, Report of sugar house and laboratory, 1890.

Bulletin No. 12, Commercial Fertilizers.

Bulletin No. 13, Sweet potatoes.

Bulletin No. 14, Sugar cane; field and laboratory results.

Bulletin No. 15, Report of veterinarian for 1891.

Bulletin No. 16, Results of North Louisiana Experiment Station, Calhoun.

Bulletin No. 17, Report of State Experiment Station, Baton Rouge.

Bulletin No. 18, Analyses of Commercial Fertilizers.

*Bulletin No. 19, Forage crops, grasses, clovers and small grains.

Bulletin No. 20, Tobacco growing in Louisiana; results at Calhoun.

Bulletin No. 21, Results of North Louisiana Experiment Station, Calhoun, for 1892.

Bulletin No. 22, Report of State Experiment Station, Baton Rouge, 1892.

Bulletin No. 23, Analyses of Commercial Fertilizers.

Bulletin No. 24, Sugar cane; field experiments, physical and physiological.

Bulletin No. 25, Tobacco at North Louisiana Experiment Station.

Bulletin No. 26, Sugar cane; varieties of cane and striped versus purple.

*Bulletin No. 27, Horticulture at Baton Rouge, Calhoun and Audubon Park.

Bulletin No. 28, Report of State Experiment Station, Baton Rouge.

*Bulletin No. 29, Results for 1893, at Calhoun.

Bulletin No. 30, Sweet potatoes (with illustrations).

Bulletin No. 31, Domestic and Commercial Fertilizers.

Bulletin No. 32, Ramie, uses, history, composition, etc.

Bulletin No. 33, Tobacco growing in Louisiana, with results at Calhoun.

Bulletin No. 34, Cattle feeding in Louisiana.

Bulletin No. 35, Report of North Louisiana Experiment Station, Calhoun, 1894.

Bulletin No. 36, Horticulture; results for 1894.

Bulletin No. 37, Windrowed versus standing canes.

Bulletin No. 38, Chemistry of sugar cane and its products.

Bulletin No. 39, Analyses of Commercial Fertilizers.

Bulletin No. 40, Cow pea; origin, botanical relations, chemical composition, feeding value, restorative virtues to the soil, etc.

Bulletin No. 41, Tobacco; results at Baton Rouge and Calhoun.

Bulletin No. 42, Horticulture; results for 1895.

Bulletin No. 43, Bovine tuberculosis in North Louisiana.

Bulletin No. 44, Charbon or anthrax, with experiences during recent outbreak in North Louisiana.

Bulletin No. 45, Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 46, Leguminous root tubercles.

Bulletin No. 47, Experiments in corn, cotton, forage crops, tobacco, etc., at State Experiment Station, Baton Rouge.

Bulletin No. 48, Report of the Entomologist.

Bulletin No. 49, Commercial Fertilizers.

Bulletin No. 50, Red rice.

SPECIAL BULLETINS.

The orange and other citrus fruits, from seed to market, with insects beneficial and injurious, with remedies for the latter.

SPECIAL BULLETINS.

Sugar Cane, History, Botany and Agriculture.

GEOLOGICAL BULLETINS.

*Part I. A preliminary report upon the hills of North Louisiana, north of the Vicksburg, Shreveport and Pacific Railroad.

Part II. A preliminary report upon the hills of North Louisiana south of the Vicksburg; Shreveport and Pacific Roilroad.

Part III. A preliminary report upon the Florida parishes of East Louisiana, and the bluff and prairie and hill lands of Southwest Louisiana.

Part IV. A preliminary report upon the bluff and alluvial lands of Louisiana.

ANNUAL REPORTS.

1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897.

BIENNIAL REPORTS.

*Vol. I, 1886; *Vol. II, 1888; *Vol. III, 1890; Vol. IV, 1892; Vol. V, 1894; Vol. VI, 1896; Vol. VII, 1898.

Reports and Bulletins marked thus (*) are out of print and cannot be supplied.

4.73
3n

ELEVENTH ANNUAL REPORT

— OF THE —

State College
of Washington
Library

Agricultural Experiment Stations

— OF THE —

LOUISIANA STATE UNIVERSITY

— AND —

A. & M COLLEGE.

— FOR 1898.—

TO THE GOVERNOR.

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1899.

ELEVENTH ANNUAL REPORT

—OF THE—

Agricultural Experiment Stations

—OF THE—

LOUISIANA STATE UNIVERSITY

—AND—

A. & M. COLLEGE.

—FOR 1898.—

TO THE GOVERNOR.

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1899.

REPORT.

LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE,
OFFICE OF STATE EXPERIMENT STATION,
Baton Rouge, January 16th, 1899.

To His Excellency, Murphy J. Foster, Governor of Louisiana :

SIR—In accordance with the provisions of Section 2, of the Act of Congress to establish Agricultural Experiment Stations in connection with the colleges established in the several States, under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of operations of the Louisiana Agricultural Experiment Stations, including a statement of the receipts and disbursements from July 1st, 1897, to July 1st, 1898.

STATION NO. 1.

Sugar Experiment Station, Audubon Park, New Orleans, La.—The main work of this Station the past year has been along the lines of further investigation of our sugar industry. Experiments in the field, sugar house and laboratory, have been continued and extended. In the field, besides the usual experiments with fertilizers and different methods of cultivation, extensive trials were made with "seedling" canes. Over thirty varieties have been tested for over four years, and of this number two or three have been found especially adapted to our soil and climate. No. 74 has been found of such excellent merit, both in sucrose content and yield in tonage per acre, that over five tons were sent out this Fall to over two hundred planters, upon their own application. A goodly quantity of No. 95 was also distributed. It is confidently expected that these new varieties of cane will prove a valuable addition to the sugar industry of this State.

In the sugar house many experiments in the "Carbonation process" were conducted, and while it was proven conclusively that under guarded conditions this process can be used, in the manufacture of sugar from sugar cane, yet no advantage was found over the methods usually practiced in our sugar houses.

By modifying the carbonation process and employing phosphoric acid for the removal of excess of lime after the latter has performed its beneficial results in the removal of gums, albuminoids, etc., at a temperature of 55 degrees, to 60 degrees, C., an excellent clarification was obtained.

Prof. W. R. Dodson has also spent the Fall in investigating with the microscope sugar cane and its products. He has given special study to the bacteria of the sugar house, and to the ferments which quickly destroy the cane after being killed by a frost. He has determined the relative amounts of solids left in the juice by the different processes of filtering and by settling.

Special experiments have been made looking to a sterilization of syrups and molasses on a large scale, which now promise success. Should they prove so, the process of sterilization of syrups and molasses can be introduced into every sugar house.

The tonnage of sugar cane this year was not quite up to last year, but the sucrose content was ruinously low; so much so, that many of our factories have incurred heavy losses upon the cane purchased. The weather during the Fall and early Winter has been execrable and has largely increased the cost of harvesting the crops. The only redeeming feature in the harvest just closing, is the fairly good prices of sugar in our markets.

The orange grove on this station bore this year a small crop of fruit, enabling the large number of varieties to be, for the first time, tested. The fibre crops, covering ramie, jute, and several varieties of hemp, have been experimented with, so as to have a supply of raw materials for testing one of the numerous machines, claiming to work successfully these crops. Capt. Allison has recently erected his new decorticating machine on this station, which will be tested the coming Spring.

Alfalfa continues to thrive on the Station, though the prolonged rainy weather, with heavy down-pours at short intervals prevailing through the Summer and Fall, destroyed a number of our stands. All surplus hay from this crop was readily sold at $15 per ton on the Station grounds.

STATION NO. 2.

State Experiment Station, Baton Rouge, La., has had two changes in its staff. Mr. D. N. Barrow, who has occupied the position of Assistant Director ever since this Station was established, has resigned and purchased a large plantation, upon which he will raise sugar cane in the future. His place has not yet been filled.

Prof. W. W. Clendenin, who has been Field Geologist, has also resigned and returned to Missouri, where he has established a private school. His place has been filled by the employment of Prof. Gilbert D. Harris, of Cornell University, who has been placed in charge of the field work of the survey, and who gives three months of each year to this work. He is ably assisted by Mr. A. C. Veatch, who devotes his entire time to the survey. It is proposed by this survey to accurately map, geologically, agriculturally, and topographically, the townships of the State, and establish a North and South line at each county seat of the different parishes; to collect soils, clays, shells [recent and fossil], plants [recent and fossil], fungii, etc. To establish the parting lines of the different formations and their differences in sylvæ.

The soils, waters, and minerals of the State are being analyzed as fast as they are collected, and later published accounts of all this work will be given to the public.

On the farm, experiments in cotton, corn, tobacco, sugar-cane, forage crops, grasses, etc., have been made, and the results are now being arranged for publication. The growing of tobacco in this State is now being agitated in many sections, and an expert tobacconist has been employed at this Station and at Calhoun, in order to continue the experiments already begun, and to instruct the farmers and planters who may embark in this enterprise.

Experiments have been continued at this Station in the investigation of Texas fever. Six more cattle have, this past year, been imported from St. Louis and subjected to various kinds of treatment looking to a more thorough understanding of the character and causes of this disease. Several species of ticks have been used in our trials, but only the cattle tick [*boophilus bovis*] has caused the fever.

These experiments have been under the joint direction of Dr. Dalrymple and Profs. Dodson and Morgan, aided by Cadet McClendon.

The Horticultural Department of this Station has, in conjunction with the similar Department at Calhoun, been busy testing the comparative merits of Northern and Eastern grown seeds versus home grown, and in nearly every instance the latter have proven the equal, if not the superior, to the former. Results are embodied in a bulletin soon to be published.

The Botanical and Bacteriological Department has been industriously prosecuted by Prof. W. R. Dodson. Results of his work are given from time to time in the published bulletins.

Dr. Dalrymple has been in requisition during the past year in many parishes to determine and eradicate contagious diseases among our stock. His public lectures have given valuable information, by which both the nature and character of contagious diseases, and their prompt extinction, are now much better understood by our farmers.

Prof. Morgan was detailed, temporarily, to take the place of Capt. T. Wood Lee, assistant director, in May last, and continued in this position until December. His discharge of these duties was eminently satisfactory to all parties, and his leaving Calhoun was regretted by the farmers of that section. He has also been busily engaged in studying the life history of many of our insects, special attention being paid to the different species of ticks in this State.

The chemical work thrown upon the Stations, by the laws of the State requiring inspection of commercial fertilizers and paris green, has become very large, and is constantly increasing. Up to the present they have promply met all the work imposed upon them. Bulletin No. 54 will show the quantity and character of such work.

STATION NO. 3.

North Louisiana Experiment Station, Calhoun, La.—Capt. T. Wood Lee, assistant director of this Station when the war with Spain began, and who was also captain of Company E, 1st Louisiana Volunteers, responded to the call of his country and went with it to the front. While in camp at Miami, Florida, with his regiment, he contracted the typhoid fever, and came to his home in West Monroe to die. A noble and generous young soul was thus sacrificed to his country's cause. Had he lived, it is believed his valuable services would have been highly appreciated by his native State; for both in the fields of war and agricultural science he exemplified those high qualities which betoken future greatness and usefulness. Louisiana, and the North Louisiana Experiment Station, suffered a severe loss in his youthful death.

The position of assistant director has again been filled by Major J. G. Lee, who assisted us in the creation of the Station and remained with it until it assumed its present proportions. His return to this work will be gladly welcomed by the farmers of North Louisiana.

The present interest in the raising of live stock and the peculiar adaptability of this State for the growing of beef cattle, has caused this Station to increase its number of breeds of cattle by the addition of a pair of Herefords, and a prospective purchase of a pair of Red Polls. The breeds already on hand are the Jersey, Guernsey, Holstein and Devons. The dairy at this Station is continued, and its output eagerly bought at 25 cents per pound.

Competitive experiments with Spanish peanuts, Velvet Beans and Unknown cow-peas, grown in the field, and chemical analyses of the entire plants from equal areas, were made by the chemist, Mr. C. A. Mooers, for the purpose of determining their comparative values as fertilizing and feeding crops, and results published in Bulletin No. 55.

Field, garden and orchard experiments have been continued, and results are now being tabulated for the press. Further experiments in the growing of the yellow leaf tobacco are demanded by the farmers of this section, who are seeking for some monied crop as a substitute for cotton. An expert tobacconist from North Carolina has accordingly been employed, and will enter upon his work February 1st.

The Sixth Annual Fair and Camp Meeting held last September was a great success from the number of exhibits and the large crowd in attendance on the opening days, but the continuous and heavy rains beginning Wednesday night and lasting till Friday, dampened the ardor of exhibiters and visitors, and a premature adjournment was effected on Friday at noon. The premium list was large and extended, and the premiums were eagerly contested.

At our solicitation, the office of Road Inquiry, of the Department of Agriculture at Washington, has kindly consented to send an expert, Mr. E. C. Harrison, to construct a model road out of the public road running for over three quarters of a mile through this station. Mr. Harrison will begin this work the latter part of this month, and when finished it will serve as a model for the guidance of the road-makers of North Louisiana. Messrs. B. F. Avery & Son, of Louisville, Ky., have kindly loaned us the necessary road implements.

The following bulletins have been issued since our last report:

Bulletin No. 51, Cattle Tick and Texas Fever.

Bulletin No. 52, Horticultural Department; report for 1896–97.

Bulletin No. 53, Grasses, Clovers, Forage and Economic Crops.

Bulletin No. 54, Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 55, Alfalfa, Spanish Peanuts and Unknown Cow-Peas experimented with.

The following constitutes the present staff of the Stations:

SUGAR EXPERIMENT STATION NO. 1.

Postoffice, Audubon Park, New Orleans, La.
William C. Stubbs, A. M., Ph.D., Director.
R. E. Blouin, M. S., Assistant Director and Chemist.
J. B. Collins, Chemist.
H. E. Wright. Chemist.
George Chiquelin, Sugar Maker.
W. B. Clayton, M. S., Farm Manager.
James K. McHugh, Secretary and Stenographer.
A. C. Veatch, Geologist.

STATE EXPERIMENT STATION NO. 2.

Postoffice, Baton Rouge, La.
William C. Stubbs, A. M., Ph.D., Director.
——————————— Assistant Director.
H. Skolfield, Treasurer.
Charles E. Coates, Jr., Ph.D., Chemist.
W. R. Dodson, A. M., Botanist.
H. A. Morgan, B. S. A., Entomologist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
F. H. Burnette, Horticulturist.
James Clayton, Farm Manager.

NORTH LOUISIANA EXPERIMENT STATION NO. 3.

Postoffice, Calhoun, La.
Willliam C. Stubbs, A. M., Ph.D., Director.

J. G. Lee, B. S., Assistant Director.
M. Bird, B. S., Chemist.
T. I. Watson, Farm Manager.
E. J. Watson, Horticulturist.
N. A. Ellegaarde, Dairyman.
J. A. Allen, Tobacconist.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30th, 1898. It shows expenditures have equalled the receipts.

Respectfully submitted.
WM. C. STUBBS, Director.

Statement of receipts and expenditures of the Louisiana Agricultural Experiment Stations, in account with the United States appropriation:

1896.	Cr.	Dr.
The receipts from the Treasurer of the United States for the year ending July 1st, 1898....		$ 15,000.00
By salaries ....$	7,604.46	
By labor	2,114.22	
By publications	2,045.35	
By postage and stationery.....	341.41	
By freight and express......................	209.02	
By heat, light and water.....................	296.30	
By chemical supplies.........................	266.36	
By seed, plants and sundry supplies..........	452.61	
By fertilizers...............................	111.89	
By feeding stuffs............................	147.94	
By library	352.02	
By tools, implements and machinery..........	345.10	
By scientific apparatus	53.62	
By live stock................................	659.80	
	$15,000.00	$15,000.00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30th, 1898, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000, and the corresponding disbursements are $15,000, for all of which the proper vouchers are on file, and have been examined by us and found correct.

J. G. LEE,
Commissioner of Agriculture and Immigration.
WM. GARIG,
Vice President of Supervisors and Ex Officio Member of Board of Agriculture.

TWELFTH ANNUAL REPORT

—OF THE—

Agricultural Experiment Stations

—OF THE—

LOUISIANA STATE UNIVERSTY

—AND—

A. & M. COLLEGE,

—FOR 1899.—

TO THE GOVERNOR.

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1900.

REPORT.

LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE,
Office of State Experiment Station,
Baton Rouge, La., January 15, 1900.

To His Excellency, Murphy J. Foster, Governor of Louisiana:

SIR—In accordance with the provisions of Section 2, of the Act of Congress to establish Agricultural Experiment Stations in connection with the colleges established in the several States, under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the three stations, including a statement of the receipts and disbursements from July 1, 1898, to July 1, 1899:

STATION NO. 1.

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS, LA.

Experiments in the field, sugar house and laboratory have been continued during the past year, looking to the amelioration of the sugar industry of this State. The experiments in the field suffered seriously by the extreme temperature of 6° Fahr., which prevailed from February 13th to 16th, 1899. Such cold has never been experienced here before by our oldest inhabitant. It destroyed a greater part of the stubbles (rattoons) and much of the seed cane, either planted or in windrow, reducing by over one-half the annual output of sugar in this State.

Taking advantage of this disaster, important studies have been made of the injured cane and stubbles, and valuable information of a physiological character obtained. Micro-photographs of sections of injured and uninjured canes were made and will be utilized to illustrate a future bulletin on sugar cane.

The experiments in fertilizers, to determine the form and quantity of each valuable ingredient best required by the growing cane plant, have been continued for ten years upon the same soil, and the results of this period are now being prepared for publication in bulletin form.

The same bulletin will contain the results of four years of different kinds of cultivation, showing most conclusively that cane is no exception to the general rule which prescribes "thorough preparation of soil, generous fertilization, and shallow and frequent cultivations." Of the large number of "seedlings" tested, one variety, No. 74, a dirty-greenish cane, has maintained its good qualities of the last five years. Both in sucrose content, and tonnage, it excels, giving this year over 38 tons per acre, which yielded, without saturation, upon our nine-roller mill 81 per cent. of juice on the weight of the cane. This juice had 16 per cent. of sucrose.

Another large quantity of this seedling was distributed to over two hundred of our sugar planters, and if it proves with them its superior merits, will be a valuable addition to our cane fields. Nos. 95 and 69 were also distributed in limited quantities, their superior merits suggesting more extensive trials.

The duration of the sugar house experiments was this year considerably shortened by the limited supply of cane. However, the opportunity was seized of completing and confirming several of the experiments of the previous year. There is now in preparation a bulletin on the "Chemistry of the Sugar House," which will embody the results of the elaborate work performed in the sugar house and laboratory for the last five years. Prof. W. R. Dodson has again spent the season in continuing his studies of the ferments of the sugar house, and special processes by which sterilization of juices, syrups, and molasses can be obtained.

The acreage in sugar cane was this year largely reduced. The tonnage, even where fair stands were secured, was rather below the average, but the sucrose content was good, and a most favorable season prevailed in this section of the State for perfect work during the harvest. The cold in early fall, which injured severely most of the standing cane in the upper sugar belt, did no damage in this immediate section. The first visitation of destructive cold was on January 1st and 3rd, 1900.

The extremely low temperature of February, 1899, which so seriously damaged the sugar cane, completely destroyed every orange, olive, and fig tree. In the severe weather of 1896, when the thermometer went down to 15 degrees F., all of the orange trees budded on the sweet, bitter-sweet and sour orange; the rough lemon and pomelo stocks were completely killed. Even the sweet (*Aurantium dulcis*) varieties, budded on the citrus trifoliata stock, succumbed, leaving only the Satsuma and Kumquats on the citrus trifoliata stock alive. It was inferred from this experience that the latter combinations were proof against any cold that this section would ever experience. Accordingly many trees of these combinations were planted with a confidence of their survival. It was therefore with both amazement and regret that we saw the trees which survived the winter of 1896 completely effaced by the cold of 1899. It may now be confidently asserted that no combination of stock and scion of the present known varieties can withstand a cold of such severity as that which occurred last winter. The Division of Pomology, of the Department of Agriculture at Washington, has been conducting a series of experiments looking to the securing of a frost-proof orange. Crossing, by hybridization, the hardier sweet varieties on the deciduous, non-edible Japanese trifoliata, it has secured a number of plants, which the Department is now distributing throughout the Southern States. Secretary Wilson has generously proffered us two trees of each of the sixty-two varieties thus produced. They are daily expected, and when received will be carefully transplanted and results awaited with considerable interest.

For the first time in the history of this station, the fig trees were killed, many not even sprouting from the roots. This destruction has temporarily suspended a profitable and growing industry of this section (canning and preserving figs).

Ramie, jute, and several varieties of hemp were grown last year with a view of testing the various machines designed to decorticate them; but the quarantine established during the fall in this section prevented a public trial.

Forage crops, grasses, clovers and alfalfa, were grown with the usual success. Considerable interest has been manifested in the growing of alfalfa all over the State, created by the great success achieved on this station, and every assistance possible in the dissemination of information has been rendered, looking to a general culture of this valuable plant.

The Egyptian varieties of cotton are still grown, with a view of ultimate acclimation. The dry season has been very favorable for both growth and fruit.

India varieties are also grown, though promising but little for the future.

Sea Island cotton could, by careful selection and proper cultivation, be grown successfully, if not profitably, all along the Gulf coast. The present prices (15 to 50 cents per pound) would justify extensive trials.

Work has been carried on during the year in crossing varieties of cotton to secure a variety or varieties better adapted to our wants, and some progress made.

A large number of varieties of cotton have been grown, and all ginned upon the roller gin. Simultaneously, the same varieties have been grown at Baton Rouge and ginned upon a saw gin. Samples of lint from both stations, of each variety, have been sent to Mr. Edward Atkinson, Boston, Mass., who will have them microscopically examined, and the tensile strength of each carefully determined, with a view of ascertaining the injury done by the saw gin.

FERTILIZER AND PARIS GREEN CONTROL.

Beside the usual work incident to the station, the chemical laboratory has been largely engaged in the analyses of fertilizers and paris green, under Acts 126 of 1898 and 131 of 1890. So great is the demand for this work, that last year nearly one thousand samples of commercial fertilizers and thirty-eight of paris green, were analyzed (see Bulletin No. 58). The present system of inspection and analyses created confidence in the buyer, and care and caution in the seller, to the mutual benefit of both. Ample protection is thus afforded the intelligent buyer, that he will get the full guarantee of the seller.

TEA CULTURE.

The Department of Agriculture at Washington has recently sent to this station 650 very vigorous tea plants of two varieties. These have been successfully transplanted and efforts will be made, in conjunction with the National Department of Agriculture, to grow tea commercially in Louisiana.

STATION NO. 2.

STATE EXPERIMENT STATION, BATON ROUGE, LA.,

Continues its work with the same efficient staff. On the farm the usual experiments in corn, cotton, forage crops, grasses and clovers, have been continued, results of which appear from time to time in the bulletins.

Beside these regular experiments, others with tobacco have been tried. An attempt has been made to grow the purest Sumatra and Havana wrappers.

Mr. Woodward, of Florida, who has had an extensive experience in the growing, curing and fermenting of the best Florida tobaccos, was employed. The best seed of many varieties were obtained and planted. The Sumatra and Havana varieties were grown in the shade (under canvas), in the half shade (laths) and in the open. All of the tobacco was well cured in the barn. It was brought to the fermenting room on the grounds of the University and there carefully fermented under the joint supervision of Mr. Woodward, the tobacconist; Prof. Dodson, the bacteriologist; and Mr. Glenk, the chemist. Each followed the tobacco through the pile, and valuable data obtained, which will later be published.

Some of the tobacco was excellent, so pronounced by the large manufacturers of New Orleans, especially that grown in half shade. Several boxes of cigars have been made from the best of the tobacco, and they are rated with good imported Havana stock.

These experiments were quite exhaustive and indicate that experience and great care and intelligence are required to make a first-class wrapper.

There is quite an inquiry for tobacco seed and literature, which are freely supplied by the station.

TEXAS FEVER.

The experiments previously made and reported looking to the "immunization" of imported cattle to that dreaded disease "Texas fever," have been continued and results have been decidedly successful. Last year two registered Herefords and twelve grade Shorthorns were imported and successfully carried through the fever, artificially created by inoculation with the defibrinated blood of an immune animal. This pronounced success induced the station to proffer its services to those contemplating importing valuable stock. This offer has been accepted by many citizens of Louisiana, and the veterinary infirmary is now filled to its full capacity with pure registered cattle of the various beef breeds, undergoing treatment.

Some have been discharged, successfully immunized; others have passed the critical period of the fever, and none up to date have died.

For particulars as to the disease and treatment, see Bulletin No. 57, which will be sent free upon application to any address.

By such treatment the great danger of importing Northern cattle to the South is decidedly minimized, if not entirely removed. It gives promise, also, of the rapid development of beef raising throughout the South, where highly nitrogenous foods, abundance of water, and mild winters produce conditions for beef raising perhaps unexcelled on the entire continent. Only the beef animals are wanting to obtain success, and these can now be imported with little or no danger from Texas fever, if properly and promptly treated.

CHARBON.

This dreaded disease prevailed to an alarming extent throughout Southern Louisiana last summer. During its prevalence Dr. Dalrymple and Prof. Dodson were sent to the field for the purpose of studying the disease and aiding in every way in checking its ravages. They visited numerous plantations in many parishes and obtained much information for guidance in future work, and also for publication in an early bulletin. Laboratory studies of the germ of this disease have been begun and will be continued until its true life history is determined.

TICKS.

Prof. Morgan has been experimenting with various ticks, studying their life histories and testing their power of producing Texas fever. It has been shown that only the cattle tick (*Boophilus bovis*) is capable of transmitting the Texas fever. His results have been published in Bulletin No. 56.

RICE.

During our sojourn in Southwest Louisiana last summer, holding Farmers' Institutes, it was found that the rice fields were becoming impregnated with red rice and other noxious weeds, whose seeds, mixing with rice in threshing, greatly injured the value of the latter. Prof. Dodson began at once a botanical investigation of the character of these noxious weeds and the best methods of eradicating them, and has since continued his work. At an early day his results will be given as part of a bulletin which will treat of rice, *in extenso*, from soil to market.

STATION NO. 3.

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA.,

Continues its popularity among the small farmers of North Louisiana. Besides the usual crops experimented with, great stress has this year been laid upon those forage crops which contribute to stock raising. The corn crop was harvested with the self-binding harvester, and when cured, it was passed through a husker and shredder which shucked the corn and delivered by carrier into a wagon, shredded the stalk, fodder and shuck, and passed them by a carrier to the loft of the barn. By grinding the corn with cob and feeding with the shredded stover, every particle of the corn crop is utilized. By thus saving the corn stalks, an immense amount of cattle food is obtained, which if properly combined with cotton seed or cotton seed meal, will feed a goodly number of stock through the winter. If the practice could become general over Louisiana, then its million and a quarter of acres now devoted to corn, would furnish at least one and a quarter millions of tons of stover, which would maintain over one million of cattle through the winter, and if additioned by cotton seed or its meal, would fatten ready for the shambles at least half of this number. At present scarcely anyone saves the stalks, and but few the fodder.

TOBACCO.

Further experiments with this crop have been continued, though the dry weather of last spring and summer prevented a realization of the accustomed yield.

LIVE STOCK.

Arrangements of pastures, coupled with the growing of forage crops, have been made looking to experiments in raising beef cattle. Already a pair of Herefords and about a dozen grade Shorthorns have been secured as a basis for beginning the work.

The dairy on the station continues its good work, and its influence in educating the farmers to a knowledge of how to make first-class butter is apparent on many farms throughout North Louisiana.

Extensive planting of grasses, clovers and forage crops have been made and are at this date looking well. The alfalfa plat continues to yield its quota of nutritious hay.

ORCHARD.

The old orchard was so badly wrecked by the severe cold of last winter that it was deemed best to plant a new one and upon a more suitable location. Accordingly this fall, after thorough preparation, several acres were planted with two trees of each variety of pear, apple, peach, etc., which experience had suggested would probably thrive in this climate. If possible, the station will find what varieties are best adapted to that section.

ROAD MAKING.

During last September the Office of Road Inquiry, of the Department of Agriculture, at Washington, kindly sent Mr.

Harrison, one of its road experts, to construct a model road out of the public road, which runs for three-fourths of a mile through this station. The road could not be satisfactorily completed at that time, on account of the severe drouth then prevailing, which rendered the clay hills tco hard for economical work. It has since, however, been satisfactorily finished by Maj. Lee, and an excellent model road is now being used by the public both for travel and for guidance in future road building.

Mr. Harrison arranged his work so as to coincide with the Seventh Annual Fair and Camp Meeting held on the closing days of September. One day of this meeting was devoted to the discussion of good roads and their benefits to Louisiana, in which Your Excellency took an active part. To this meeting every police jury in the State was invited to send a representative. Many complied with the request, and it is believed that the occasion served as a powerful stimulus to future building of good roads. In the afternoon of the second day, a practical lesson in road making was given by Mr. Harrison.

This fair and camp meeting was like all former ones, a great success, both in the number and enthusiasm of its visitors, and the quality and quantity of the exhibits. The premium list was large and the prizes eagerly sought by the exhibitors.

LOSS OF BUILDINGS.

On October 5th, during a prolonged drouth, while running the farm engine, a spark from the boiler lodged in the shredded fodder and hay of the barn loft. In a few minutes the barn was consumed with all of its contents. The fire caught the adjoining buildings and consumed the tool shed, carriage house and horse stable. It was only by co-operative work and quick dispatch that the rest of the buildings on the station were saved. The losses were partially covered by insurance.

Since the fire, a large barn and a combined stable and tool house, both 40x60 feet, two stories high, covered with galvanized iron, have been erected and are now being used.

GEOLOGICAL SURVEY.

Mention was made in my last report of the employment of Prof. Gilbert D. Harris, of Cornell University, to conduct the field work of the survey. He gives three months of his services to actual field work. He is ably assisted by Mr. A. C. Veatch, who devotes his entire time to the survey. Conjointly they have recently prepared a report of the first year's work, which is now in print and will be issued to the public in a few weeks. The following is an outline of the report:

GEOLOGICAL SURVEY OF LOUISIANA.

Report for 1899.

Letter of transmission—Dr. Wm. C. Stubbs.
Introduction—G. D. Harris.

PART I.

Final report on reconnoissance work in Louisiana; being a resume of what is known regarding the geology of the State—Harris and Veatch.

- History of Geological Investigations in Louisiana:
  - First period, early explorations to 1867.
  - Second period, reconnoisance:
    - Prior to Experiment Station work, from 1867 to 1892.
    - Experiment Station work, 1892 to 1898.
- Geology of the State by formations:
  - Cretaceous
  - Eocene
  - Neocene
  - Quaternary

  Illustrated by a geological map of the State, a general map of the geology of the Mississippi embayment, and numerous engravings.
- Resume of our present knowledge of the fossil remains of the State:
  - Invertebrata.
  - Vertebrata.
  - Plantæ.
- Economic products of the State:
  - Salt.
  - Sulphur.
  - Clays.
  - Marl.
  - Building Stone.
  - Limestone.
  - Lignite.
  - Iron Ore.
  - Lead.
- Artesian Waters.

PART II.

Detailed work of the geological survey.

Special papers by various authors.
- Reports on certain important areas throughout the State:
  - Shreveport Area With Map and Sections—By A. C. Veatch.
  - "Many" Area With Map—By A. C. Veatch.
  - Sabine River Area With Sections—Veatch and Harris.
  - Winnfield Area—Marble Quarry, Coochie Brake, With Maps and Sections—Harris and Veatch.
  - Natchitoches Area With Maps and Sections—G. D. Harris.
  - The Five Islands, With Maps, Model, Sections and Engravings—A. C. Veatch.
- Magnetic Declination and the Establishment of Meridional Lines—G. D. Harris.
- Paleontology:
  - Cretaceous—Midway and Lignitic Eocene—By G. D. Harris. All species figured.
  - Eocene Paleobotany—Description and illustration of the fossil plants collected by the survey during 1899—By Arthur Hollick, Columbia University.
- Report on the Clays of Louisiana Collected by the Survey, 1899—Dr. Heinrich Reis.
- Road Improvement—G. D. Harris.
  - What is Being Done by Other States for the Improvement of Highways.
  - How to Commence the Work of Improving the Roads of Louisiana.
- Index.

They are both now in the field and are diligently prosecuting their work. Particular attention is given to the study of the underlying water-bearing strata with a view of determining the artesian possibilities in every section of the State. Later, a map of the State showing such possibilities will be given the public.

SOIL SURVEY.

Through the liberality of Prof. Milton Whitney, Chief of Division of Soils, approved by Secretary James Wilson, of the Department of Agriculture, arrangements have been made for studying and mapping the soils of Louisiana. The Division of Soils will furnish the necessary field assistants for three or four months of each year to perform the work in Louisiana, mapping the soils and collecting samples, and will make the necessary mechanical analyses, prepare the manuscript maps of the soil areas, and suitable descriptive matter to accompany each map. The Experiment Station will

FARMERS' INSTITUTES

Were held in many of the parishes of this State, under the direction of Gen. Leon Jastremski, Commissioner of Agriculture and Immigration. Nearly every member of the staff of the stations took an active part in these institutes, and the great good accomplished will more than compensate for the absence from official duties.

The following constitute the present staff of the stations:

SUGAR EXPERIMENT STATION NO. 1.

Post Office, Audubon Park, New Orleans, La.

William C. Stubbs, A. M., Ph. D., Director.
R. E. Blouin, M. S., Assistant Director and Chemist.
J. F. Harp, B. S., Assistant Chemist.
H. E. Wright, B. S., Assistant Chemist.
Simon Baum, B. S., Assistant Chemist.
George Chiquelin, Sugar Maker.
W. D. Clayton, M. S., Farm Manager.
Arthur C. Veatch, Geologist.
James H. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION NO. 2.

Post Office, Baton Rouge, La.

William C. Stubbs, A. M., Ph. D., Director.
———, Assistant Director.
Charles E. Coates, Jr., Ph. D., Chemist.
R. Glenk, B. S., Assistant Chemist.
W. R. Dodson, A. B., S. B., Botanist.
H. A. Morgan, B. S. A., Entomologist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
F. H. Burnette, Horticulturist.
James Clayton, Farm Manager.

NORTH LOUISIANA EXPERIMENT STATION NO. 3.

Post Office, Calhoun, La.

William C. Stubbs, A. M., Ph. D., Director.
J. G. Lee, B. S., Assistant Director.

make the chemical analyses. The Department will furnish the station with copy of the manuscript maps, with mechanical analyses, and descriptive matter, with permission for publication. The Division of Soils pays the salaries of the above assistants, and the station pays their expenses while engaged in the work.

In accordance with this agreement, Profs. Dorsey and Smith, of the Division of Soils, reported for duty on the 1st of December, 1899, and were assigned to work in the Florida parishes, beginning at the northwestern corner of West Feliciana and proceeding directly eastward to the Pearl river. They have finished the Florida parishes and have now divided, Prof. Dorsey going along the line of the Southern Pacific, platting a township at each of the following places: Gretna, Lafourche Crossing, Schriever, Franklin, Adeline, Iberia, Lafayette, Crowley, Jennings, and Lake Charles. At Lake Charles he will proceed northward along the line of the Pittsburg and Gulf, selecting a township at De Quincy, Leesburg, Many and Mansfield.

Prof. Smith starts at Vicksburg and proceeds along the line of the Vicksburg, Shreveport and Pacific Railroad, mapping a township at Delta, Tallulah, Delhi, Girard, Monroe, Calhoun, Arcadia, Minden, Red River bottoms in Bossier, and Shreveport. At Shreveport he will start south on the Pittsburg and Gulf, and take typical townships in the vicinity of Gloster, Mansfield and Natchitoches.

The work this year will cover the typical soil areas of the State, and will aid us greatly in our already extended study of the soils of the State.

It is hoped, if finances will permit, to continue this survey until every parish in the State will be thoroughly mapped and every type of soil thoroughly studied.

The work in the laboratories keeps pace with the progress in the field. Over five hundred mechanical and two hundred chemical analyses of the soils of the State have already been made, and it is the aim and design of the station to accompany the soil maps with complete analyses of the soils, and full description of the best modes of treatment when devoted to different crops.

Maurice Bird, B. S., Chemist.
T. I. Watson, Farm Manager.
E. J. Watson, Horticulturist.
W. T. Carter, Dairyman.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30, 1899. It shows expenditures have equalled receipts. There were other receipts besides those from the Hatch fund.

In closing this, my last official report to you as Governor of the State, permit me to return my high appreciation of, and sincere thanks for, the generous interest and cordial support which you have, for the past eight years, manifested in the stations and the agricultural welfare of Louisiana.

Respectfully submitted,

WM. C. STUBBS,
Director.

Statement of receipts and expenditures of the Louisiana Agricultural Experiment Stations, in account with the United States appropriation:

1899.	Cr.	Dr.
The receipts from the Treasurer of the United States for the year ending July 1, 1899		$15,000 00
By salaries	$ 7,911 77	
labor	2,869 63	
publications	737 15	
postage and stationery	332 30	
freight and express	335 43	
heat, light and water	142 25	
chemical supplies	351 85	
seeds, plants and sundry supplies	555 25	
fertilizers	120 76	
feeding stuffs	260 16	
library	141 52	
tools, implements and machinery	110 47	
scientific apparatus	119 84	
live stock	1,011 62	
	$15,000 00	$15,000 00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30, 1899, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000 and the corresponding disbursements are $15,000, for all of which the proper vouchers are on file, and have been examined by us and found correct.

LEON JASTREMSKI,
Commissioner of Agriculture and Immigration.
WM. GARIG,
Vice President of Supervisors and ex-officio Member
of Board of Agriculture.

293r
3

M. E. JAFFA.

THIRTEENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY

AND

A & M. COLLEGE,

FOR 1900.

TO THE GOVERNOR.

State College
of Washington
Library

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1901.

THIRTEENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY

AND

A & M. COLLEGE,

FOR 1900.

TO THE GOVERNOR.

BATON ROUGE.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1901.

REPORT.

LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE,
OFFICE OF STATE EXPERIMENT STATION
Baton Rouge, La., 1901.

To His Excellency, W. W. Heard, Governor of Louisiana:

SIR—In accordance with the provisions of Section 2, of the Act of Congress to establish Agricultural Experiment Stations in connection with the colleges established in the several States, under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the three stations, including a statement of the receipts and disbursements from July 1, 1899, to July 1, 1900:

STATION NO. 1.

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS, LA.,

has continued along the lines described in previous reports. Sugar cane has received the largest attention. In the field, experiments to determine the manurial requirements of this plant have been continued on the same plats for eleven years. Four plats have been devoted to these experiments, known as the "Nitrogen," "Phosphoric Acid," "Potash" and "Application" plats.

On the Nitrogen plat, the questions requiring solution were: (1st.) Do our alluvial lands require nitrogen to grow profitable crops of sugar cane; and, (2nd.) If they do, in what forms and in what quantities shall it be used. On this plat the following forms of nitrogen were used, viz.: Nitrate of soda, sulphate of ammonia, dried blood, fish scrap, cotton seed meal and tankage. These were used in such quantities as to give twenty-four and forty-eight pounds of nitrogen per acre. They were used alone and in combination with mixed minerals (acid phosphate and sulphate of potash.) In addition, there were experiments throughout the plat with "no manure" and with "mixed minerals" alone. There are twenty experiments of three rows each. The same manure has been used on each plat for eleven years.

The results of the first ten years were given to the public last year in Bulletin No. 59.

This plat has clearly demonstrated the following facts on these soils:

1st. That nitrogen is needed to grow maximum crops of sugar cane.

2nd. That nitrogen in the form of sulphate of ammonia is preferred to all others, followed in order by cotton seed meal, dried blood, tankage, nitrate of soda and fish scrap.

3rd. That quantities of nitrogen in excess of forty-eight pounds per acre, are rarely profitable with our prevailing climatic conditions.

The prevailing custom among the sugar planters of using cotton seed meal (either alone or mixed with acid phosphate) and tankage is in accord with the above results.

Similar questions relative to the requirements of cane for phosphoric acid were asked of the next plat. Here the soluble forms of phosphoric acid in dissolved bone black and acid phosphate, and the insoluble forms in ground bone, bone black, Thomas slag meal and floats, were used. They were used alone and in combination with basic mixture (sulphates of ammonia and potash). Such quantities were taken as to contain thirty-six and seventy-two pounds of phosphoric acid. Here, too, sub-plats, with "no manure" and with "basic mixture" alone, were regularly placed throughout the plat for comparison. This plat also contains twenty experiments.

The results of eleven years on these soils show:

1st. That phosphoric acid in relatively small quantities is needed for best yields.

2nd. That the soluble forms are usually to be preferred.

3rd. That quantities in excess of thirty-six pounds of soluble phosphoric acid per acre, are useless, if not injurious.

Like questions propounded to the potash plat have not been productive of positive results. Here, the forms of potash used were kainite, "the sulphate," "the muriate," "the carbonate," and "the nitrate of potash." These were used alone and in combination with "nitrogen phosphate" (Sulphate of ammonia and acid phosphate). Such quantities of each were used as to represent twenty-five and fifty pounds of actual potash.

Sub-plats of "no manure" and "nitrogen phosphate" occurred regularly throughout the plat.

The results of this plat have all been negative, no benefit apparently either in tonnage or sugar content of the cane. Several forms of the above, when used in the larger ration, seem to have acted injuriously upon the physical texture of the soil, making the latter stiffer and more difficult to properly till.

These results unmistakably declare, (1st) that nitrogen is the dominant ingredient needed by these soils to grow sugar-cane, and (2nd) that phosphoric acid in an available form is needed in comparatively small quantities, and (3d) that, as yet, these soils possess enough available potash to meet all the requirements of the sugar cane.

An acre of cane should therefore receive from thirty-six to forty-six pounds of nitrogen, and twenty-four to thirty-six pounds of available phosphoric acid, in order to grow the most profitable crop throughout a series of years.

In practice, due regard must be paid to the time which has elapsed since the land was in cow-peas, and the further removed the cane crop is from the latter the heavier must be the dose of nitrogen.

The fourth plat is devoted to the application of fertilizers. Having determined that nitrogen, the fugitive ingredient of fertilizers, is the one most needed for cane, the question arises whether this ingredient shall be given in one, two, or three applications. Nitrate of soda and sulphate of ammonia, on account of their ready solubility, were used as the forms of nitrogen and in quantities representing forty-eight pounds per acre. The mixed minerals were applied uniformly with the first application. There are three series of each experiment. 1st. All of the nitrogen applied with "mixed minerals" just before the soil is thrown to the cane after a stand is obtained. 2nd. One-half is applied with mixed minerals at this time, and the rest given at the second or third working in May. 3d. One-third with mixed minerals as first application, one-third at second or third working in May, the remaining third at lay-by.

While individual years show decided gains of two and three applications over one, the results through a series of years indicate that one application is the least expensive and perhaps the most profitable.

Experiments in methods of cultivation have shown that the use of the cultivators only, in the cultivation of the crop after the middles have been split out, has resulted each year in decided gains. The plow is a most excellent implement when properly used, but should find no place in cultivation after the cane has well developed roots, or after the tilth has once been developed in the soil.

PEDIGREED CANE.

Numerous experiments have been conducted with a view of determining the influence upon the crop by selection of seed each year.

For over fourteen years, "tops from tops," "middles from middles," "butts from butts," "large cane from large cane," "medium cane from medium cane," and "small cane from small cane," "plant from plant," "first stubble from first stubble," and "second stubble from second stubble," have been planted, and results in field and sugar house carefully tabulated and compared. While indications point to suggestions of superiority, yet no very positive conclusions are deducible from tabulated results.

VARIETIES OF CANE.

The station has imported nearly every available foreign variety of cane and has had them under cultivation for years. Some of them have merit, but not deemed worthy of replacing our home canes. They are still grown, to study the influence of continuous cultivation upon them in this climate as regards their hardiness, sugar content, power of rattooning, etc. Hope has, however, been abandoned of ever securing from them a cane superior to our ribbon or purple varieties.

But high expectations are placed upon some of the which are now being disseminated throughout the sugar world.

Many years ago the station received from Prof. Harrison, of Demerara, a number of seedlings. These have ever since been carefully experimented with, both in the field, in the laboratory and in the sugar house. Of these, two, D74 and D95 have shown qualities admirably adapted to this soil, in tonnage, sugar content, hardiness and vigor of growth. Two years ago a distribution of these canes among the planters of this and adjoining States began. Last year over 1250 bundles weighing in the aggregate over thirty tons, were shipped throughout Louisiana, Texas, Mississippi, Alabama and Georgia. Our supply was totally inadequate for the demand, and over 500 applications were referred to the crop of the present year. These canes have been distributed with the request of thoroughly testing them before cultivating on a large scale. Should they prove (especially D74) as satisfactory elsewhere as here, they will be a valuable addition to the sugar interests of the South.

There are also on trial a number of seedlings received several years ago from Barbados, and twelve new seedlings obtained during the past summer from Prof. Hart, of Trinidad. This large number may give a variety superior even to D74 and D95.

SUGAR HOUSE.

In the sugar house, an extensive series of experiments in clarification, filtration, evaporation and cooking, has been carried on, and the results are now in manuscript form awaiting publication.

Besides these a series of systematic experiments with artificial mixtures of sugar and other substances usually found in cane juice, has been carefully conducted in the sugar house, controlled by chemical analysis, with a view of determining the restraining influence of these added substances to the crystallization of sugar. These extensive experiments are nearly completed and will be given at an early day to the public.

ALFALFA

continues to thrive upon this station, though the prolonged drouth of last season was more destructive than ever before. Planted in October upon well prepared land, at the rate of fifteen to twenty pounds of seed per acre, and well covered, it will afford the first cutting in March or early in April. Six to eight cuttings a year may be expected. Fed either green or cured, it is a valuable forage, rich in protein and exceedingly palatable to all animals.

CLOVER AND GRASSES.

It has been found that seed from home-grown crops of clover and grasses were far superior in their germinative qualities to those purchased elsewhere. The crops were also superior in vigor of growth, and yield per acre.

The necessity of planting these crops here in early fall, before the new crop of grass and clover seeds are on the markets, forces us to use seed over one year old. The use of such seed may in part account for the poor stands obtained, and for the excess of seed so often recommended by many planters to be sown per acre. It now appears that for the best results our clover and grass seeds must be raised at home. This assertion is at present accentuated at both this station and Calhoun, in the vast superiority of the Rescue grass from home raised seed over that purchased.

FORAGE CROPS.

In addition to those already reported, and which have become popular throughout the State, the station has now growing a large number of vetches, lupines, beans, etc., from foreign countries, some of which were furnished by the United States Department of Agriculture, and the rest by its correspondents in foreign countries.

CORNS.

A large number of varieties of corns gathered from all parts of the world, were cultivated at this and the other stations last year. While many of these have decidedly superior qualities, nearly all are wanting in that quality most desired in this section, viz., proof against weevils. Hence the tenacity with which the planters of this section of the State adhere to the "yellow Creole," a nearly weevil-proof variety.

COTTON.

A large number of foreign and domestic varieties of cotton have also been tried at this and other stations. Several varieties from India and Egypt have been carefully grown with the hope of acclimating them, especially the latter, and thus assist in inaugurating an industry which will supply the mills of this country with home raised Egyptian cotton, and stop the present large importation. These cottons have been ginned upon an Egyptian roller gin and marketed. Neither the quantity produced per acre, nor the price obtained per pound, warrants the extended cultivation of these cottons. Experiments with Sea Island cotton have been more successful. The yields per acre have been as high as 1500 pounds of seed cotton, and the prices obtained for the lint were seventeen cents to thirty cents per pound, in Charleston, South Carolina.

The station received several years ago a few seeds of a variety of cotton which had been developed by Col. Griffin, of Greenville, Miss. It has since planted and selected this variety, until last year quite a crop was grown. The lint is extremely long, the plant a vigorous grower and a prolific bearer of fruit.

It is adjudged an all around excellent variety, and this year, through the franking privilege accorded us by the United States Department of Agriculture, over three hundred small packages of this seed have been distributed among our farmers and planters.

ORANGE TREES.

The small grove of budded trees started since the destructive freeze of February, 1899, is now in excellent condition and promises a few oranges the present year. There are over fifty varieties.

In addition to this grove, there are over one hundred orange trees mentioned in the last annual report, as hybrids between the hardier sweet varieties and the non-edible Japanese trifoliata, growing on the grounds of the station. These trees were furnished by the Department of Agriculture at Washington, and are being carefully cultivated until they bear fruit. If the fruit should prove edible and desirable, the trees will be used for furnishing buds for future orchards. If they be worthless, the trees will be uprooted and destroyed. Out of the sixty and odd varieties, it is hoped that one or more may prove desirable.

TEA PLANTS.

In co-operation with the United States Department of Agriculture, this Station is growing over 600 tea plants, with a view of testing practically the raising and curing of tea leaves. The success of the industry in South Carolina has stimulated the Department of Agriculture to try it elsewhere in the South.

REMOVAL OF SUGAR HOUSE, BARN, ETC.

Since the last report, the city council of New Orleans has granted to the Illinois Central Railroad the right of a double line of tracks along the river from Southport to Stuyvesant docks. This grant necessitated the removal of the sugar house, boiler house, barn, stable and stabler's house by the railroad. They were moved up nearer to the other buildings of the station, and everything reconstructed in good working order. The fences, water pipes, etc., were also removed.

FERTILIZER AND PARIS GREEN CONTROL.

In addition to the regular work of the station, over 1800 analyses of commercial fertilizers and of paris green have been made during the year under Acts 126 of 1898 and 131 of 1890.

The present system of inspection and analysis has created a confidence in the buyer and care and caution in the seller. Both are greatly benefited by the law, which affords ample protection to the purchaser, and advertises well the wares of the seller.

The work, however, is very heavy, requiring almost the entire time of four to five chemists to perform. It is also expensive, since every purchase, whether one sack or a thousand tons, must be inspected and sample analyzed.

Since the last report the station has lost the efficient services of its Assistant Director, Mr. R. E. Blouin. He has been elected to the directorship of the Hawaiian Experiment Station, Hawaii, as the successor of Dr. Walter Maxwell (who was also formerly connected with this station), who has now been called to Queensland, Australia, as the Director of the Sugar Experiment Station recently established there.

Mr. P. L. Hutchinson, of the chemical department of the Department of Agriculture of Georgia, has recently been appointed chemist of this station, and placed in charge of the fertilizer and paris green work.

Mr. S. Baum, a graduate of the Louisiana State University and A. & M. College, Baton Rouge, in 1899, and since than an assistant chemist at this station, has recently accepted a position upon a sugar estate in Mexico, and has left for his new home. Mr. H. E. Wright, another one of our chemists, has recently accepted the position of chemist on the Waialea Plantation, Hawaii, and will leave us in a few days.

Mr. T. W. Young, Jr., who graduated last June at the Louisiana State University and A. & M. College, at Baton Rouge, entered in July upon the duties of assistant chemist at this station.

STATION NO. 2.

STATE EXPERIMENT STATION, BATON ROUGE, LA.,

has made no changes in its efficient staff since the last report.

THE FARM.

Experiments with fertilizers on corn and cotton, similar to those described at Audubon Park on sugar cane, have been in continuous operation on this station since 1888. The results here are slightly different from those obtained on cane at Audubon Park. While it is shown that both nitrogen and phosphoric acid are needed by the soil to grow maximum crops, it is yet quite clear that phosphoric acid is the dominant ingredient in all fertilizers which produce the largest yields. This is especially noticeable in the growth of corn.

The rotation plats, carrying oats, solid cow-peas, cotton, corn and cow-peas, a three-year system involving five crops, two of which are leguminous, are giving decided responses to the question of the best method of restoring the soils of the bluff regions.

A number of varieties of corns and cottons were grown last year, with generally satisfactory results. Quite a number of farmers and planters have been supplied with seeds of the choicest varieties of these crops.

FORAGE CROPS.

Besides the usual sorghums (saccharine and non-saccharine), millets, teosinte, etc., usually grown, this station has successfully established a field of lespedeza and one of the red clover. The former yielded a large quantity of excellent hay, while the latter, besides a crop of early hay, afforded excellent grazing far into the winter for a number of cattle. There is also an acre or more of a magnificient crop of

"ALFALFA"

which is greatly admired by the visiting farmers and planters.

There are also good stands of several varieties of grasses, besides a beautiful crop of Fall sown oats.

TOBACCO.

The experiments in tobacco reported last year, have been largely repeated. The full shade was discared and only the half shade empolyed in addition to numerous experiments in the open field. A number of varieties were tested, but effort was mainly concentrated upon the production of wrappers from the Havana and Sumatra seed.

The crop was harvested in excellent order, and cured thoroughly in the barn. It is now in the pile undergoing fermentation. Later on it will be made into cigars. The experiments up to date, would indicate that the soil of this station is rather too heavy for the production of the largest and best crop of wrappers. While selection will give some ideal wrappers, which work well into excellent cigars, the proportion of these to the entire crop is too small to permit of large profit. Reference is made to first-class Sumatra and Havana wrappers, and not to the larger and cheaper leaves, often used in low-priced cigars.

It is believed that the same types of tobacco, under similar treatment upon the light loamy soils of North Louisiana, will yield far better results, and therefore the present year will find the experiments duplicated at Calhoun.

CATTLE.

Besides the small herd of pure Jerseys, there are a number of grade Short Horn cows, which were imported two years ago for Texas fever experiments. Later a pair of pure Herefords were imported for breeding purposes. After immunization by inoculation, this couple were turned out with the grade Short Horn herd. Up to date there are several fine grade Hereford calves, which will furnish a foundation for a future beef herd.

A pair of pure Red Polls, purchased for the use of the North Louisiana Experiment Station, have just been successfully inoculated at the Infirmary at Baton Rouge. As soon at the Spring opens they will be shipped to Calhoun and will furnish a start for that section, of a dual purpose breed, believed to be the ideal one for the small farmers of that section.

TEXAS FEVER.

Mention was made in the last report of the experiments in the "immunization" of Northern cattle to the Texas fever. Since that report the station has inoculated scores of cattle imported by the farmers of the State from the North and the results have been highly satisfactory, as will be shown by a bulletin now in preparation.

During the present winter the finest specimens of Jerseys, Herefords and Red Polls have been treated and so far with perfect success. About a dozen of the fine Herefords, exhibited and sold at the great Chicago Fat Cattle Show in December, were bought by an enterprising citizen of this State, and have been successfully inoculated.

The valuable additions to our live stock will soon be apparent in the improved beeves on our market, and the increased price of the animals on the farm.

CANE BORER.

In certain sections of this State, this insect last year was quite destructive. At the request of the Sugar Planters' Association, an investigation of the ravages of this insect was undertaken and a report made to that body in January. Simultaneously, Prof. Morgan began a thorough investigation into the winter habits of this pest, and has studied it in the field and laboratory, and though his work is yet incomplete, enough has been learned to enable him to advise intelligently those planters who are afflicted with its presence. When his studies are completed, it is expected to publish the results in bulletin form.

Prof. Dodson has been busily engaged during the past year in valuable botanical and bacteriological work. Among the latter is a process of sterilizing syrups and molasses, and drawing from the vessels containing them samples, at any time, through a sprigot so constructed as to sterilize the entering air by passage through a tube of sterilized cotton.

This process, when perfected, will be given to the public and it is believed, if properly operated, will be of great value to syrup and molasses dealers of the State.

Dr. Dalrymple, besides superintending in person the Veterinary Infirmary, where so many valuable animals have been inoculated, has been repeatedly called to different parts of the State, to assist in the determination and eradication of contagious and infectious diseases among stock.

STATION NO. 3.

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA.

Since the last report, Major J. G. Lee, Assistant Director, has resigned and again accepted the position of State Commissioner of Agriculture and Immigration. His valuable services, though lost directly to the station, are now available to the entire State, and every branch of agriculture is receiving his fostering care and attention.

Mr. D. N. Barrow, formerly Assistant Director of the State Experiment Station, Baton Rouge, has been appointed to this station, and entered upon his duties last summer.

The crops harvested last year were the finest ever grown on this station, some varieties of corn yielding as high as seventy bushels per acre. This crop was harvested and shredded as described in last report, and has furnished valuable forage for sheep, cattle, mules and horses of this station. Attention is again called to the large waste of forage material, by leaving the corn stalks in the field, and it is hoped that the increased interest in cattle growing in this State will aid in eliminating this useless loss of valuable forage, and make it a basis for a maintenance of many thousand cattle during the winter.

The rotation plats on this station are a great success, and serve as an object lesson to the farmers of this section, showing plainer than words can describe, the ease and rapidity with which these soils can be resuscitated.

These plats are duplicated with and without manures.

With such a system of rotation, aided by proper fertilization, every worn acre of North Louisiana can be rapidly improved and brought up to a condition which will permit of profitable culture. Along with the improvement of the soils, come annually profitable crops.

Fertilizer experiments similar to those described at the other stations, have also been conducted here. The results are similar to those at Audubon Park, with decided emphasis upon the necessity of nitrogen for every crop grown.

Nitrogen is the first and crying want of these soils. Phosphoric acid, though of secondary consideration, is yet required in small quantities for the best results.

TOBACCO.

Experiments, under the management of Mr. Allen, an expert from North Carolina, have not been successful either last or this year. The crop was not handled with intelligence either in the field or barn.

The present year it will be handled under the supervision and direction of the assistant director and farm manager of the station. In addition to the yellow leaf varieties which are known to succeed well in this section, extensive experiments will, the present year, as elsewhere remarked, be made with the cigar types. The resemblance of the soils of North Louisiana to those of Florida, justifies the hope that the finest Sumatra and Havana wrappers can be successfully grown.

LIVE STOCK.

Mr. W. T. Carter, who has had charge of the stock of the station, resigned in October last to accept a position at the Pennsylvania Agricultural College, and his place has been filled by Mr. Albert N. Hume, of Indiana, a graduate of the Purdue University. Mr. Hume entered upon his duties in December.

The dairy is continued upon a high plane of excellence, a model for the education of the farmers of this section. It has taught hundreds of farmers the proper methods of manipulating milk and butter, and the proper feeding and care of milch cows. Many farmers are now selling first-class butter in the towns and villages of North Louisiana, and a few are sending to distant markets.

As elsewhere remarked, this station is preparing this section of the State for the introduction of the dual purpose cow, an animal believed to be suitable to the environments of the small farmer. It has already the Devon breed, and has recently imported a pair of Red Polls. It is claimed that the Jersey, now omnipresent in this section, has served a useful purpose in teaching the farmer how to make good butter. This accomplished, its usefulness to the farm is considerably abridged by the inability to sell at remunerative prices, the male offspring. Hence the supposed adaptability of the so-called dual purpose cow.

SHEEP.

There are four breeds of sheep on this station, the Dorset, the Merino, the Southdown and the Shropshire. There are grades, also, of each flock.

For some years the station has been suffering with the loss of lambs in summer, and occasionally an imported animal would die. A study of the cause has revealed the existence of a minute intestinal worm (*Œsophagostoma Columbianum*). This worm or parasite bores into the tissue of the bowels and causes enlargements, which give to the disease the name "nodular disease of the intestines," or vulgarly, "knotty guts." Investigation has shown that the disease is quite prevalent in many parts of the State.

Butchers of Baton Rouge assert that at times a majority of the sheep slaughtered for the local market are affected with this knotty or lumpy condition of the intestines, which renders them totally unfit for sausage casings. The presence of this worm is a menace to the sheep industry of this State, and perhaps of the South, and steps have recently been taken looking to a study of its life history, and, if possible, its eradication.

To this end Dr. Dalrymple and Prof. Morgan have recently secured some sheep affected with nodular disease, and will begin a thorough study of the parasite. It is intended by Dr. Dalrymple to endeavor to infest a small pasture lot at the station with these worms by placing on it, for a time, sheep that are known to be affected. Subsequently, healthy animals will be placed upon the same lot, and if they become diseased it will prove the supposition that animals become affected by grazing on pastures previously infested by diseased sheep. Later, this pasture lot will be ploughed up, and, when in condition, healthy sheep will be again placed in it to graze. Should such animals then remain free from this disease, it will go to show that the worms on the pastures can be destroyed, or rendered hors du combat, by turning over the ground. Prof. Morgan intends making a study of the parasite from a life-history standpoint. It is hoped that valuable information, which may be turned into practical utility, may be secured from these investigations.

Apparently not all breeds have suffered alike. Two years ago a pair of each of the above breeds were bought. Of the Shropshires, one buck and five ewes, all young, were imported. The Shropshires, Southdowns and Dorsets, have suffered perhaps in the order named. While the Merinos have not yet had a loss of any kind.

At present this disease seems almost to forbid the introduction of pure breeds in this State. This is truly to be regretted, and every effort will be made by the stations to ameliorate this condition, and to adapt this State to the successful growing of the finest herds of sheep.

HOGS.

The following breeds are kept at this station: Berkshire, Essex, Poland China and Red Jerseys. The increase is usually taken as fast as it occurs, by the farmers of the State.

FORAGE CROPS

are grown quite extensively, both in quantity and variety. The grasses and clovers are at present looking well, and alfalfa has given several large cuttings during the past year. A series of forage crops ripening in succession, was grown last year, and gathered by hogs which, with the use of movable fences, were permitted to eat up each patch before being admitted into another. The hogs were weighed at stated intervals and the increase carefully recorded.

ORCHARDS.

The new orchard mentioned in the last report, has made a vigorous growth during the year, and not a tree has died. It promises a thorough test of the adaptability of many varieties to this section. The old orchard still contains some valuable trees of several varieties of pears and apples. It is gratifying to record the complete eradication of the "blight" from the station, after years of persistent efforts.

The last camp meeting and fair, held in October, on the grounds of the station, under the auspices of the North Louisiana Agricultural Association, was largely attended and greatly enjoyed. It was opened with a barbecue given by the citizens of the vicinity to the old Confederate soldiers, and was enjoyed by several hundred veterans, and scores of their friends and admirers.

GEOLOGICAL SURVEY.

"The Report for 1899," a synopsis of which was given in the last year's annual, has been published. It is a handsomely printed and illustrated volume of 354 pages, and has been well received by the public. The demand for the book continues both from our own citizens and from those seeking information relative to the resources of the State.

Prof. Gilbert D. Harris, of Cornell University, is still in charge of the survey, and is now in the field, assisted by Mr. J. Pacheco. The results of the work for 1900-1901 will be published in a large volume during the coming summer.

Mr. A. C. Veatch, the efficient assistant of Prof. Harris last year, has resigned and has entered as a student in Cornell University, where he purposes graduating.

In the study of artesian wells, and the strata supplying the water, a large amount of information has been obtained. The rate of flow and the depth of wells have been determined in the field, and the analysis of the waters made in the laboratory.

SOIL SURVEY

mentioned in the last report will be continued. It has, however, been found almost impossible to map the soil areas which were examined, until a topographical survey of the State is made. Preliminary arrangements have been made with the United States Geological Survey to begin the work during the present year. The soils obtained are being analyzed both physically and chemically, as fast as our limited force can make them. Prof. Milton Whitney, chief of the "Division of Soils," Department of Agriculture, contemplates a continuance of the soil survey under arrangements similar to those described last year.

FARMERS' INSTITUTES

were held in many of the parishes of this State, under the direction of Major J. G. Lee, Commissioner of Agriculture and Immigration. Nearly every member of the staff took an active part in these Institutes, and it is believed that the good accomplished by these efforts more than compensated for their absence from official duties.

VISIT TO HAWAII.

In July last, by request, and under a commission from the

Hon. Jas. Wilson, Secretary of Agriculture, Washington, D. C., the director of this station visited the Hawaiian Islands, studied the agricultural resources, and located an Experiment Station on the Island of Oahu, near Honolulu.

On returning, a lengthy report was made, which was transmitted by President McKinley to the House of Representatives with the request that it be printed. This report, with numerous illustrations, has been published as a House document, and may be obtained from any Congressman.

The following constitute the present staff of the stations:

SUGAR EXPERIMENT STATION NO. 1.

Postoffice, Audubon Park, New Orleans, La.

William C. Stubbs, A. M., Ph. D., Director.
P. L. Hutchinson, B. S., Chemist.
R. Glenk, Ph. G., B. S., Chemist.
H. E. Wright, B. S., Assistant Chemist.
T. W. Young, Jr., B. S., Assistant Chemist.
George Chiquelin, Sugar Maker.
W. B. Clayton, M. S., Farm Manager.
Gilbert D. Harris, Geologist.
James K. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION NO. 2.

Postoffice, Baton Rouge, La.

William C. Stubbs, A. M., Ph. D., Director.
———, Assistant Director.
Simon Baum, Chemist.
W. R. Dodson, A. B., B. S., Botanist and Bacteriologist.
H. A. Morgan, B. S. A., Entomologist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
F. H. Burnette, Horticulturist.
James Clayton, Farm Manager.

NORTH LOUISIANA EXPERIMENT STATION NO. 3.

Postoffice, Calhoun, La.

William C. Stubbs, A. M., Ph. D., Director.

D. N. Barrow, B. S., Assistant Director.
Maurice Bird, B. S., Chemist.
Jas. F. Harp, B. S., Chemist.
T. I. Watson, Farm Manager.
E. J. Watson, Horticulturist.
Albert N. Hume, Dairyman and Poultryman.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30, 1900. It shows that expenditures have equalled receipts.

There is also given a supplementary statement of receipts from all sources and expenditures of every kind.

All of which is respectfully submitted.

WILLIAM C. STUBBS,
Director.

STATEMENT OF RECEIPTS AND EXPENDITURES OF THE LOUISIANA AGRICULTURAL EXPERIMENT STATIONS, IN ACCOUNT WITH THE UNITED STATES APPROPRIATION:

1900	Cr.	Dr.
The receipts from the Treasurer of the United States for the year ending July 1st, 1900		$15,000.00
By salaries	$ 7,937.85	
By labor	2,595.48	
By publications	1,659 82	
By postage and stationery	452.13	
By freight and express	269 07	
By heat, light and water	217 93	
By chemical supplies	160.84	
By seeds, plants and sundry supplies	506.23	
By fertilizers	44.02	
By feeding stuffs	341.49	
By library	141.58	
By tools, implements and machinery	227.31	
By scientific apparatus	85.70	
By live stock	360.55	
	$15,000.00	$15,000.00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30, 1900, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000.00, and the corresponding disbursements are $15,000.00, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed) J. G. LEE,
Commissioner of Agriculture and Immigration.
WM. GARIG,
Vice-President of Supervisors and ex-Officio
Member of Board of Agriculture.

SUPPLEMENTARY STATEMENT.

1900.	Cr.	Dr.
To receipts from other sources than the United States, for the year ending July 1, 1900:		
To Balance, July 1, 1899		$12,830 42
State appropriation		15,000 00
Geological survey fund		3,000 00
Insurance		2,005 00
Fertilizer and paris green fund		5,514 25
Farm products		1,669 90
Miscellaneous receipts		144 42
		$40,163 99
By Salaries	$10,786 67	
Labor	4,927 68	
Freight and express	510 85	
Heat, light and water	413 77	
Chemical Supplies	305 38	
Seeds, plants and sundry supplies	961 14	
Fertilizers	257 21	
Feeding Stuffs	648 36	
Tools, Implements and Machinery	431 58	
Furniture and fixtures	194 07	
Traveling expenses	457 05	
Contingent expenses	1,678 79	
Building and repairs	6,605 48	
Insurance	222 75	
Geological survey	3,000 00	
		31,400 78
By balance July 1, 1900		$8,763 21

34.73
13a
.2

State College
of Washington
Library

FOURTEENTH

ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

A. and M. College.

FOR 1901.

TO THE GOVERNOR.

BATON ROUGE, LA.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE
1902.

REPORT.

Louisiana State University and A. and M. College,
Office of State Experiment Station,
Baton Rouge, La., January 24, 1902.

To His Excellency, W. W. Heard, Governor of Louisiana:

Sir—In accordance with the provisions of Section 2, of the Act of Congress to establish Agricultural Experiment Stations in connection withthe colleges established in the several States, under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations, including a statement of the receipts and disbursements from July 1, 1900, to July 1, 1901.

STATION NO. 1.

Sugar Experiment Station, Audubon Park, New Orleans. La.

Mr. R. E. Blouin, who resigned in October, 1900, to accept the directorship of the Hawaiian Sugar Experiment Stattion, returned to us in September last and resumed his former position as Assistant Director. The station is fortunate in recovering his services.

The energies of this station are directed mainly along lines looking to the improvement of the sugar industry. The season just closed, while detrimental to many of the planters of the State, on account of the scarcity of labor and the frosts, has been a very successful one on this station. The aggregate yield of cane in the field has been large, and the results in the sugar houses have been very satisfactory. The experiments with fertilizers have been continued with more positive results. The usual forms of Nitrogen have given decided increments in the field without detriment to the sugar yield. Phosphoric acid in moderate quantities has also been found beneficial. The continued applications of the various forms of potash has not yet produced any visible effects. The number of varieties of seedling canes under cultivation has been largely increased during the year by contributions from Trinidad, Barbados, and Hawaii. Extensive experiments were made in the field with Seedlings D. 74 and D. 95, with eminently successful results. After distributing about thirty tons to hundreds of planters in this and adjoining States, enough was left of each to make a run in the sugar house. This run was extremely satisfactory, and a bulletin giving the results is now in press. It will also contain the field and laboratory results of all the seedlings experimented with up to date. Seedlings T. 111 and T. 189, seedlings respectively of D. 74 and D. 95, are included in our nursery, and the stalk analyses of this year show these canes to be superior to their parents.

The series of cultivation experiments have been continued, and the results for the past two years are now in press as Bulletin No. 66.

Experiments in the application of fertilizers, as well as in pedigreeing cane, heretofore fully explained, are also being continued.

In the sugar house, a series of experiments in clarification have been continued, checked by original investigations in the laboratory under my assistant, Mr. R. E. Blouin. These experiments will be embodied in the "Chemistry and Mechanics of Sugar Cane," Vol. 11, now being written. It is expected to be issued during the present year.

The young orange grove of this station bore a small quantity of fruit, enabling us to test for the first time some of the many varieties therein. The one hundred and odd orange trees, crosses between the hardy Trifoliata and the various Sweet oranges, are doing well and are expected to fruit during the present year. If a single tree should bear an edible fruit, it will be reserved and used for propagating trees for distribution among the orange growers.

Crops of ramie, jute and hemp have been grown with the expectation of testing some of the many machines whose inventors claim can successfully decorticate the fibres from these plants, but none appeared, and the crops were lost.

A large number of varieties of cotton were also grown on these grounds, and experiments were made by Prof. W. R. Dodson, of our staff, and Prof. S. M. Tracy, of Mississippi, in hybridization by cross pollination of desirable varieties. By selection, a very fine variety of cotton has been developed, the seed of which was last year and this, extensively distributed over this State.

Experiments with the various garden, forage and grass crops continue. The tea plants, set out two years ago, are doing well and are expected to furnish leaves for the manufacture of tea during the present year.

A number of new tropical plants obtained from the Department of Agriculture at Washington, and elsewhere, were tried upon grounds of this station last year with varying results. Seeds from many have been obtained and planting will be made again this year.

During the fall a large and interested class of sugar students from the State University at Baton Rouge, assisted in the work of the station, in the field, laboratory and sugar house. They are members of the Audubon Sugar School, and will graduate in 1903. Such graduates will be valuable aids to the sugar cane industry.

STATION NO. 2.

State Experiment Station, Baton Rouge, La., which has been without an Assistant Director for the last two years, is now under the charge of Prof. W.R. Dodson, who gives his entire time to the work.

Mr. James Clayton, who has been Farm Manager for some years, has resigned and gone to farming. His place has been filled by Mr. Atkinson, of Missouri.

Experiments in the fertilization of corn and cotton have been continued, as well as testing the different varieties of these two staple crops.

Experiments with Havana and Sumatra tobacco have also been continued without marked success. Alfalfa, Red clover and Lespedeza have all given large yields during the past year. The pure Hereford bull on this station has been crossed on a number of grade Shorthorns, with very promising results. Several young bulls of this cross have been sold to the farmers of this State, one of them weighing, at ten months old, 710 pounds, raised entirely on its mother's milk and grass of the pasture. Several very fine heifers of this cross are retained for breeding purposes. While attending a convention of real estate agents in Central Illinois, the question was asked if our home-raised feeds could be economically used to produce first-class beef, with the remark that its successful solution would largely influence a desirable class of Western farmers, accustomed to feeding cattle, to move South. After considering this question, it was determined to put it to a practicul test. Accordingly, through the assistance of friends, seventeen steers and sixteen heifers (high grades) of the Polled Angus breed were secured and shipped to Baton Rouge. Along with them was shipped also a pure bred Angus bull. These cattle arrived safely, and have by inoculation been successfully immunized from Texas Fever. The steers are being fed upon home products and every effort will be made to place them next winter as finished beef upon the Chicago market. Six of the heifers have been disposed of; the rest will be used for breeding purposes. When one considers the ease with which forage crops of all kinds can be grown in this section, and the usual cheapness of cotton seed meal, rice-bran, molasses, etc., the conviction is overwhelming that the finest beef can easily and cheaply be raised here, provided, the best beef type of cattle be obtained and properly cared for. There are now on this station, the three beef breeds, Shorthorns (grades only) Herefords, and Polled Angus (pure and grades.) Experiments with these different breeds will, it is hoped, aid materially in establishing a beef industry in this State. The station, too, will give particular attention, in the near future, to the growing of such crops as will conduce to the successful conduct of such an industry.

TEXAS FEVER.

Early in 1896, this station imported from Memphis four head of cattle for the purpose of experimenting in successfully rendering Northern cattle immune to the dangers of Texas fever. After trying experiments for several months, it was learned with surprise and regret that they were natives of an infected region, and therefore already immune.

In 1898, a large lot was imported from St. Louis, and various experiments performed without decided results. Again, in 1899, another lot was imported, and this time innoculated with the blood from our native cattle and rendered immune. Since that time the station has opened an infirmary for the innoculation of imported cattle, and up to date over two hundred head have been successfully operated on. These cattle, purchased by the farmers of this State, were innoculated free of cost (save feed and attendance) by the station. All of them were good animals, some exceedingly fine, yea, show specimens. This demand upon the station, indicates the widespread interest in the growing of good stock. The work of investigation and inoculation has been ably performed by Dr. Dalrymple and Profs. Dodson and Morgan. The last has simultaneously investigated the life history of the Cattle Tick, the vehicle by which the Texas fever is communicated, and has published the results in Bulletin No. 56. Full results of the work of inoculation have been published in Bulletins Nos. 57 and 64.

Experiments looking to a complete study of the life history of the Stomach Worm in sheep are in progress, and it is hoped that some method may be found by which the sheep of this State can be freed from this dreadful parasite.

Besides the work above alluded to, Dr. Dalrymple has rendered valuable aid to the various Police Juries and individuals when called upon in the public interest.

Prof. Morgan has rendered valuable assistance to the sugar planters of this State by his careful studies of the Cane Borer. His report to the Sugar Planters' Association was highly appreciated and gratefully received.

The Horticultural Department of this station has continued its experiments with vegetables and fruits. It has demonstrated the superiority of home-grown over Northern seed of nearly every kind of vegetable grown in this section. It has also distributed cuttings and rooted plants of many new varieties of fruit.

STATION NO. 3.

North Louisiana Experiment Station, Calhoun, La., has not had a favorable season during the past year. The drouth prevailing in the early part of the summer, seriously injured the corn and hay crops, and damaged the cotton and tobacco crops. Experiments in varieties of corn and cotton, as well as fertilizers adapted to these crops, are continued. A large number of forage crops and grasses are grown. Among the former, the Dwarf Essex Rape has proven a great success, furnishing up to the late severe cold, a large amount of forage for the stock. The young orchard on this station is growing finely, and promises its first fruit the present year.

The dairy continues its good work and furnishes an object lesson to the farmers in the art of butter making. The dairy herd has been increased during the year by the addition of a pair of Red Polls. The last head of Holstein has been disposed of, this breed, on account of size and feed requirements, proving unprofitable to this section where butter and beef only are desired. There are now on this station, four breeds, Jersey, Guernsey, Devons and Red Polls.

The sheep on this station have, during the past year, done better than heretofore. The losses from stomach worms were prevented by keeping them throughout the season on a large woods pasture, hitherto unoccupied by sheep.

There are four breeds of hogs on this station, the increase from which are sold to the farmers of Louisiana at prices fixed by the North Louisiana Agricultural Society.

Mr. T. Ivy Watson, the Farm Manager on this station, almost from its inception, much to the regret of every one, resigned his position in December last and entered upon other duties. It is a pleasure, however, to announce that Mr. Wm. R. Goyne, an agricultural graduate of the State University, has been appoitned in his place, and has entered upon his duties.

The annual Camp Meeting and Fair was held on the grounds of the station in October last. The attendance was large and the exhibits numerous and very creditable. The display of hogs was exceedingly fine. The premium list was large and extended, and the premiums were eagerly contested.

GEOLOGICAL SURVEY

is continued by Prof. G. D. Harris, assisted by Mr. J. Pacheco. They are both now in the field studying the horizons of water-bearing strata in North Louisiana. Prof. Harris is also establishing at each parish seat in North Louisiana a true meridian line, for future use of surveyors and engineers. He has established this line in nearly all of the parishes of South Louisiana. The report of his work, covering the last two years, is now being prepared for the press and will be issued early in the spring. It will treat of the following:

A (1) Part I—Establishing meridian lines for the parishes in the Northern part of the State that have already gotten ready for the work.

(2) A review of the Bayou Macon hills.

(3) A study of the Harrisonburg area of Vicksburg.

(4) A review of all points in Tertiary stratigraphy in the Southern part of the State.

B (1) A review of all oil wells and data in South Louisiana.

(2) A review of all water wells and data in South Louisiana.

C (1) A report embodying all definite data regarding geographic, hypsometric and geologic locations, to show what part of the State has been triangulated by the United States Engineers and Coast Survey, where their stakes are and where every bench mark is.

(2) Part II—A further report dealing with the stratigrapy of the State as it is now known after the recent investigations, borings, etc.

(3) Part III—Dealing with the artesian water question of Louisiana, together with a general discussion of the subject.

(4) Part IV—Louisiana oil and its geology.

(5) Part V—Description of meridian lines established.

Both Prof. Harris and his assistant have worked most diligently and have accomplished a great deal with the very small appropriation given to the survey.

ANALYSES OF FERTILIZERS AND PARIS GREENS.

It is made the duty of the Director of this Station to analyze all fertilizers and Paris Greens inspected by the Department of Agriculture of this State. During the past year 2,511 samples of fertilizers and 71 samples of Parish Greens were received and analyzed. This involved an immense amount of work, and nearly the entire time of five chemists was required to perform it. It is a source of gratification that both dealers and planters esteem highly the character of the work performed, and are willing without complaint to settle all differences by the published analyses. The entire work of the year ending Sept. 1, 1901, was given to the press in bulletin form early last fall.

PAN-AMERICAN EXPOSITION.

By appointment from your Excellency in February last, I entered upon the duties of Commissioner for Louisiana, in conjunction with Major J. G. Lee, Commissioner of Agriculture and Immigration, to the Pan-American Exposition. We succeeded by hard work in collecting and displaying a very large exhibit at Buffalo. This exhibit covered every product of the field, garden and orchard and the manufactured products of the same. It included an extensive forestry display with some handsome articles manufactured from the same. It embraced also samples of salt, petroleum, marble, tiles, brick and waters.

The exhibit was visited by thousands and greatly admired. The attractions of the State, as demonstrated by the extensive exhibits, were supplemented by handbooks, maps and circulars descriptive of the State and thousands of each were distributed. It is believed that an immense benefit will accrue to the material interest of this State by such an extensive advertisement of its resources.

Louisiana Day, to which your Excellency lent such valuable service, was a great success. Mr. Robert Glenk of the Station's staff was detailed to remain with this exhibit, and has by his enthusiasm and courtly ways won the esteem and thanks of every visitor.

At the close of the Pan-American Exposition, this exhibit was, under instructions from you, removed to Charleston, where it is now installed, superintended by Mr. Glenk. It is hoped that it may accomplish the same good ends it did at Buffalo.

The following constitute the present staff of the stations:

SUGAR EXPERIMENT STATION NO. 1.

Postoffice, Audubon Park, New Orleans, La.

William C. Stubbs, Ph.D., Director.
R. E. Blouin, M. S., Assistant Director.
P. L. Hutchinson, B. S., Chemist.
Simon Baum, B. S., Assistant Chemist.
G. W. Agee, B. S., Assistant Chemist.
T. D. Boyd, Jr., B. S., Assistant Chemist.
G. D. Harris, M. S., Geologist.
J. Pacheco, Assistant Geologist.
George Chiquelin, Sugar Maker.
Wm. D. Clayton, M. S., Farm Manager.
Jas. K. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION NO. 2.

Postoffice, Baton Rouge, La.

William C. Stubbs, Ph.D., Director.
W. R. Dodson, A. B., S. B., Assistant Director, Botanist and Bacteriologist.
C. E. Coates, Ph.D., Chemist.
H. A. Morgan, B. S. A., Entomologist.
F. H. Burnette, Horticulturist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
B. H. Atkinson, Farm Manager.
H. Skolfield, Treasurer.

NORTH LOUISIANA EXPERIMENT STATION NO. 3.

Postoffice, Calhoun, La.

William C. Stubbs, Ph.D., Director.
D. N. Barrow, B. S., Assistant Director.
M. Bird, M. S., Chemist.
W. R. Goyne, B. S., Farm Manager.
E. J. Watson, Horticulturist.
A. T. Anders, Dairyman and Poultryman.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30, 1901. It shows that expenditures have equalled receipts.

There is also given a supplementary statement of receipts from all sources and expenditures of every kind.

All of which is respectfully submitted.

WM. C. STUBBS, Director.

FINANCIAL STATEMENT.

Statement of Receipts and Expenditures of the Louisiana Agricultural Experiment Stations, in account with the United States Appropriation:

1901.	Cr.	Dr.
The receipts from the Treasury of the United States for the year ending July 1, 1901		$15,000 00
By Salaries	$ 7,181 28	
By Labor	2,879 75	
By Publications	1,768 85	
By Postbge and Stationery	379 51	
By Freight and Express	295 85	
By Heat, Light and Water	306 97	
By Chemical Supplies	484 36	
By Seeds, Plants and Sundry Supplies	286 46	
By Fertilizers	101 66	
By Feeding Stuffs	355 88	
By Library	227 78	
By Tools, Implements and Machinery	404 55	
By Scientific Apparatus	44 90	
By Live Stock	282 20	
	$15,000 00	$15,000 00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30, 1901, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000.00, and the corresponding disbursements are $15,000.00, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed) J. G. LEE,
Commissioner of Agriculture and Immigration.
WM. GARIG,
Vice-President of Supervisors and ex-Officio Member of Board of Agriculture.

SUPPLEMENTARY STATEMENT.

1901.	Cr.	Dr.
To receipts from other sources than the United States, for the year ending July 1, 1901		
To Balance, July 1, 1900		$ 8,763 21
State Appropriation		15,000 00
Geological Survey Fund		2,000 00
Fertilizer Fund		2,350 03
Farm Sales		1,481 73
Miscellaneous receipts		672 54
		$30,267 51
By Salaries	$10,883 22	
Labor	3,953 01	
Freight and Express	408 57	
Heat, Light and Water	423 93	
Chemical Supplies	668 89	
Seeds, Plants and Sundry Supplies	395 61	
Fertilizers	140 39	
Feeding Stuffs	491 46	
Tools, Implements and Machinery	558 67	
Furniture and Fixtures	135 06	
Traveling Expenses	123 90	
Contingent Expenses	1,344 20	
Building and Repairs	709 77	
Insurance	383 00	
Geological Survey	2,000 00	—$22,619 68
By Balance July 1, 1901		$ 7,647 83

FIFTEENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY
AND A. & M. COLLEGE.

FOR 1902

TO THE GOVERNOR.

BATON ROUGE:
PRINTED AT THE TRUTH BOOK AND JOB OFFICE
1903.

FIFTEENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE.

FOR 1902.

TO THE GOVERNOR.

BATON ROUGE:
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1903.

REPORT.

Louisiana State University and A. & M. College,
Office of State Experiment Station,
Baton Rouge, La., January 24, 1903.

To His Excellency, W. W. Heard, Governor of Louisiana:

Sir—In accordance with the provisions of Section 2, of the Act of Congress to establish Agricultural Experiment Stations in connection with the colleges established in the several States, under the provisions of an Act approved July 2. 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations, including a statement of the receipts and disbursements from July 1, 1901, to July 1, 1902.

STATION NO. 1.

Sugar Experiment Station, Audubon Park, New Orleans, La.

The work of this station has been continued along lines already given in previous reports. Every department of the sugar industry has been investigated with a view to improvement. Field experiments with fertilizers continue upon the same plats, with results almost identical with those previously given. The number of varieties of seedling canes has been largely increased during the year, and many of the most promising have been transferred from the nursery to the field for general cultivation. After supplying the wants of the planters, enough of the varieties of the seedlings known as D. No. 74 and D. No. 95 were left to permit of two successful runs in the sugar house, results of which are herewith given in condensed form. There is also given results of the previous year with these seedlings, and for comparison, yields and analyses of our home canes.

Comparative Merits of Seedlings No. 74 and No. 95 With Our Home Varieties—Purple and Striped.

In 1901 there was given the first opportunity to test in the sugar house, the merits of the seedlings Nos. 74 and 95, from Demerara. Run No 8 at the Sugar Experiment Station given below, was made from the residues of plant, first and second stubbles, of the two varieties, left over after the demands of the planters were supplied. The stubbles were mainly from plant canes, cut the previous year early in Octboer. The maximum tonnage given was from a few rows cut for the mill in November of the previous season. The final molasses still contains a small quantity of available sugar. The following is the complete record:

Run 8, 1901. Plant, first and second years' stubble. D No. 74 and D No. 95.

	Analysis.		
	Brix	Sucrose	Glucose
D No. 74. Plant cane	15.00	11.75	1.24
First year's stubble	15.53	12.61	.86
Seecond year's stuubble	16.03	13.15	.92
D No. 95. Plant cane	14.90	11.90	1.70
First year's stubble	14.78	11.62	1.47
Second year's stubble	15.35	12 30	1.50

Pounds of cane ground, D No. 74	18,651
Pounds of cane ground, D No. 95	8,219
Total pounds of cane ground	26,870

Extraction, 75.36 per cent.

Pounds of juice extracted, 20,250.

Pounds of first sugar obtained	1,929
Pounds of second sugar obtained	491
Pounds of third sugar obtained	73
Pounds of total sugars obtained	2,493

Pounds of total sugars per ton of cane, 185.6.

Pounds of first sugar per ton of cane 143.6

	Sucrose.	Glucose.
Analysis of first sugar	94.5	2.10
Analysis of second sugar	81.9	4.65
Analysis of third sugar	84.4	4.50

Analysis of Third Molasses—Total solids, 79.98; sucrose, 31.97; glucose 28.98; solids not sugar, 19 03; glucose ratio, 90.63; purity coefficient, 39.97.

Maximum tonnage per acre	44 02
Minimum tonnage per acre	25.79

RESULTS IN 1902.

This year two adjoining plats were selected and home canes planted in one and D. No 74 in the other. They were cultivated alike The home canes gave a continuous stand, while No. 74 was gappy in the center of the plat. Each plat was divided for comparison into subplats of three rows each, and weighed at harvest separately and juices therefrom analyzed. On account of a "gappy" stand in the center of the No. 74 plat, the yield in tonnage there was below the average of the plat. Each plat was run through the sugar house separately and juice weighed and analyzed, the home cane in Run No. 6 and No. 74 in Run No. 7. The following are the comparative results:

Run No. 6—Pounds of cane ground	23,361
Run No. 7—Pounds of cane ground	24,942
Run No. 6—Pounds of juice extracted	17,662
Run No. 7—Pounds of juice extracted	19,171
Run No. 6—Percentage of juice (extraction)	75.61
Run No. 7—Percentage of juice (extraction)	76.86

Run No. 6—Analysis of juice:

Brix.	Suc.	Glu.	Other Solids.	G. R.	P. C.
14.39	10.69	1.70	2.00	15.90	74.28

Run No. 7—Analysis of juice

Brix.	Suc.	Glu.	Other Solids.	G. R.	P. C
15.56	12.14	1.13	2.29	9.31	78.02

Run No. 6—Maximum sucrose	11.00 per cent.
Run No. 7—Maxium sucrose	12.90 per cent.
Run No. 6—Minimum sucrose	9.60 per cent.
Run No. 7—Minimum sucrose	10.70 per cent.
Run No. 6—Pounds first sugar obtained	1,348
Run No. 7—Pounds first sugar obtained	1,800
Run No. 6—Pounds first sugar per ton cane	115
Run No. 7—Pounds first sugar per ton cane	144
Run No. 6—Pounds first sugar per acre, maximum	4,035
Run No. 7—Pounds first sugar per acre, maximum	5,545
Run No. 6—Pounds first sugar per acre, minimum	3,257
Run No. 7—Pounds first sugar per acre, minimum	4,234

Run No. 6—Analysis of first sugar; Glucose, 1.19; sucrose, 96.05 per cent.

Run No. 7—Analysis of first sugar; Glucose 1.64; sucrose, 94.05 per cent.

Analysis of first molasses:

	Total solids.	Suc.	Glu.	Solids not sugar.	G. R.	P. C.
No. 6	63.06	36.10	16.60	10.36	45.98	57.24
No. 7	57.18	35.39	9.50	12.29	26.84	61.89

Run No. 6—Maximum tonnage per acre	35 03
Run No. 7—Maximum tonnage per acre	38.57
Run No. 6—Minimum tonnage per acre	28.28
Run No. 7—Minimum tonnage per acre	29.40

In strike No. 7 the sugar boiler lost grain at first and made finally a small grained sugar which rather depreciated the yield.

Below is given Runs Nos. 4 and 8. Run No. 4 was of first and second year stubbles, of home canes, which were harvested in season 1900-1901. Run No. 8 was of first and second year stubbles of Nos. 74 and 95, most of which were cut early in October each year for shipment to the planters. The maximum given below represents those rows which were not cut until the regular harvest. The following are the results-

RUNS.

No. 4—Maximum tonnage per acre	24.28
No. 8—Maximum tonnage per acre	34.35
No. 4—Minimum tonnage per acre	16.92
No. 8—Minimum tonnage per acre	22.56
No. 4—Pounds of cane ground	30,625
No. 8—Pounds of cane ground	19.125
No. 4—Percentage of extraction	73.20
No. 8—Percentage of extraction	73.67

No. 4—Analysis of juice:

Brix.	Suc.	Other Glu	solids.	G. R.	P. C.
15.74	12.54	1.04	2.18	8.29	79.67

No. 4—Maximum sucrose	13.70
No. 8—Maximum sucrose	15.40
No. 4—Minimum sucrose	9.90
No. 8—Minimum sucrose	11.50
No. 4—Pounds of first sugar per ton cane	129 6
No. 8 Pounds of first sugar per ton cane	139.1
No. 4—Pounds of first sugar per acre, maximum	3,146
No. 8—Pounds of first sugar per acre, maximum	4,778
No. 4—Pounds of first sugar per acre, minimum	2,198
No. 8—Pounds of first sugar per acre, minimum	3,138

The following is the composition of the first molasses:

	Total solids.	Suc.	Glu.	Other solids.	G. R.	P C.
No. 4	63.79	39.94	13.33	10.52	33.37	62.61
No 8	58.66	37.28	10.25	10.13	27.49	63.57

A close inspection of the above will show the merits of the seedlings D No. 74 and D. No. 95, which have now been on trial at the Sugar Experiment Station for eight years.

Seedlings T. No. 111, and T. No. 189, seedlings respectively of D. 74 and D. 95, have this year been transferred to the field, and if future experiments shall sustain their high sucrose content, they may also prove valuable additions to our sugar fields.

Experiments in cutivation continue. and it is extremely gratifying to the station workers to learn from the returns recently made to the Sugar Planters' Association that fully eighty per cent ot the planters of this State have adopted the teachings of this station, and are using the improved methods of cultivation.

Our planters are generally fertilizing their crops with marked intelligence and with increased returns. The thorough preparation of the soil, the proper fertilization of the cane, with rational and economical cultivation, have enabled our planters to survive the disastrous seasons of the last four or five years.

The sugar house continued its work of clarification, checked by extensive investigations made by Dr. C. A Browne, jr., who is devoting his time to the study of the composition of the sugar cane and its juices. In Bulletin No. 75. now in press, is given the results of his work on "Enzymes in Cane." The results of his studies of the "Germs in Cane" will soon be given to the public.

The preservation of syrups and molasses by sterilization, and the results of a study of the yeasts, molds and bacteria which cause a destruction of sugars, have been made the subject of Bulletin No. 75. The results given represent the patient and thorough work of Prof. W. R. Dodson for the past three or four years. By following the directions given, any small farmer can put up annually syrup sufficient for the wants of his family throughout the year, and perhaps some to spare.

By a device, illustrated in the bulletin, dealers may be enabled to put up sterilized syrup or molasses in large vessels, from which consumers or retailers can draw at pleasure without fear of fermentation.

THE ORANGE GROVE

continues to thrive and it is expected to gather a fair crop of fruit this year, both from the sweet oranges and the numerous crosses of the trifoliata and the edible oranges. Elsewhere, it is reported that crosses, similar to those in this orchard, have borne edible fruit, and this emboldens us to hope for success in our efforts the coming season.

FIBRE CROPS.

Ramie, jute and several varieties of hemp have again been grown during the past year. Late in November the Faure Decorticating machine reached New Orleans and was installed on this station. It is the invention of Mr. P. Faure of Limoges, France, and was delayed in shipment. Unfortunately it reached us too late to be tested last year, all of the plants being over ripe and injured by cold.

COTTONS.

Fifty-four varieties of cotton were grown upon this station, covering many from India, Egypt, Japan and this country. They were all (Sea Island, Egyptian, long and short staple uplands) ginned on the roller gin imported from England. Seeds of several varities were distributed for trial among the planters of the State.

CORNS.

A large number of varietes of corns of the six species, were grown. The species known as "Zea Tecta," with every grain in a shuck, and the entire ear also covered with shuck. was grown quite extensively to determine its merits as a feed stuff, when the entire ear was fed either whole or crushed.

TEA PLANTS.

The dry summer was unpropitious for the growth of the tea plants alluded to in our last report, and will therefore prevent the early harvest of leaves to be made into tea this spring.

GARDEN, GRASS AND FORAGE CROPS

were grown. In the garden, as well as in the field, the superiority of home-raised seed was again demonstrated. Rescue grass. raised from homegrown seed, has proven perennial and is now growing well through the second winter, surviving the entire summer. Whilst that from bought seed disappeared completely after seeding in May. This grass affords excellent grazing throughout the winter, if sown in early fall.

Varieties of sorghums (saccharine and non-saccharine), millets, teosinte, beggarweeds, vetches, lathyrus, clovers, alfalfa, velvet beans and cow-peas have been very successfully grown during the past year, of the newly imported varieties, the Mauritius bean (Mucuna ——?) did well, giving an immense vine and ripening a few pods. The Pigeon Pea (Cajanus indica) grew to an immense height, making a large stalk and a dense foliage. It bloomed profusely, and late in the season produced a few seed.

A plant kindly sent us by Mr. Auguste De Villele, editor of Revue Agricole of St. Denis, Reunion, and known botanically as "Tephrosia canille," made a fine growth. but was killed by frost when in full bloom. Astragalus sinicus (an early and a late variety) was planted upon a large area. A good stand was obtained and the plants grew to maturity and ripened seed, but the quantity of hay produced per acre was insignificant It is unworthy of further trial. Russian vetch has proven a sucess as a winter crop, readily reseeding itself the following fall. Phasemy (Phaseolus semierectus) and several varieties of Dolichos, made exellent growths, ripened their seed and in ever way did well, but are greatly inferior to cow peas and velvet beans, and are deemed unworthy of cultivation here.

White lupins, green grams, sand vetch, several varieties of horse beans and soja beans, sent by the Department of Agriculture from Washington, were more or less unsuccessful.

SUGAR SCHOOL.

During the fall, twelve sugar students from the Audubon Sugar School of the Louisiana State University, were given instruction in pratical work by lectures and experiments in the field, laboratory and sugar house.

STATION NO. 2

State Experiment Station, Baton Rouge. La., has continued its work under Prof. W. R. Dodson, Assistant Director, with Mr. B. H. Atkinson as farm manager.

Besides the regular experiments in fertilizers, and with varieties of corn and cotton, an immense deal of work has been done in the raising of forage crops for feeding the large herd of cattle on the station. Besides the pure bred Herefords, there are ten grade Shorthorn cows, nine grade Hereford heifers. ten Polled Angus cows and heifers, sixteen fattening Polled Angus steers, one registered Polled Angus bull, and one grade Jersey cow. These cattle, notwithstanding the prolonged drouth of last summer, were successfully pastured upon eighteen acres—perfect demonstration of the capacity of our native pastures to sustain an extensive cattle industry.

The calves bought in Illinois, November, 1901, and mentioned in our last annual report, were successfully immunized against Texas Fever. The females were turned out in the regular pastures with other cattle, while the steers have been regularly fed upon home-grown products, viz., cotton seed meal, rice bran, molasses and hay, given in balanced rations, with a view of preparing them for the Chicago markets.

These steers are now doing well and gaining on an average of over two pounds per day. They now average over 1,000 lbs each, and will be ready for the market some time during the year.

It has been found during the summer, that the ticks maturing upon these cattle were much more virulent than those grown upon home-raised cattle. So great was the suffering from this tick infestation that these animals did not gain at all during the month of August, and a few had high fever. By clearing them of ticks in September they all began to show immediate gains. These experiments have emphasized the sufferings of our native cattle from tick infestation, and every effort should be made to keep them comparatively clean during our long summers. Imported cattle, even after complete immunization, should not be permitted to become heavily infested with ticks at any time, if the best results are desired.

Excluding the period of heavy infestation of ticks, these cattle have done well and made excellent gains upon our home products, demonstrating the value of the latter as cheap feed for fattening all kinds of stock. So great is the demand for immunized bulls of the beef breeds, that every male calf dropped in the last two years has found an earger purchaser, and several names are recorded for "future deliveries." It may be mentioned that hogs have been following these cattle during feeding.

DIGESTIBILITY OF RICE, BRAN AND POLISH.

Local dairies, sugar and rice planters have fully demonstrated the feeding values of these by-products of our rice mills, and the prices which they now fetch in our local markets attest their extensive consumption. While highly appreciated at home, all works on feeding give them both low coefficients of digestibility. Upon investigation it was found that these figures were based upon unreliable data. After corresponding with the authors of works on "Feeds," it was determined to test experimentally the real exponents of digestibility of these feeds. Accordingly, three steers weighing in the aggregate about 4,000 lbs, were procured for the experiment. Rice bran was first used. After getting the animals well accustomed to this food a regular maintenance ration of it alone was daily given. A preliminary feeding of a week or more preceded the experiments Then a systematic weighing and sampling of all the bran consumed and the excreta voided by each animal began and continued through six days. These samples from each animal are now being analyzed by Mr. Chiquelin and Dr. Browne in the laboratory of the Sugar Experiment Station. In a few days, similar experiments will be made with rice polish. When completed the results will give the full feeding values of these by-products. and will add materially to the accurate knowledge of the digestibility of Southern feed-stuffs. When completed the results will be published in a special bulletin.

Prof. H. A. Morgan has been experimenting during the year with various mixtures for spraying cattle, with a view of killing the ticks without injury to the animal, and has reason to believe that his efforts have been successful. He has been equally as successful in finding a wash which will repel the horn-fly, a veritable terror to cattle, particularly to those individuals of dark or black colors.

During the year he has published in Bulletin No. 70 the complete results of his investigations of the Sugar Cane Borer.

Investigations of Texas Fever and the tick which conveys it, are still going on, with the hope that ultimately some means may be shown by which both may be eliminated from the South.

Dr. Dalrymple, assisted by Prof. Morgan, has continued his experiments in the study of the nodular worms in sheep, and the results obtained clearly indicate a way by which a flock of sheep may be raised entirely free from these parasites. These results embodied in a bulletin. now in press, will be of great value to the sheep breeders of the country.

Dr. Dalrymple has been called during the year to assist in eradicating infectious and contagious diseases among stock in several parishes of the State. He has recently attended the National Live Stock Association of America, where by invitation he lectured upon the "Infectious Diseases of Farm Animals." He has also, by invitation, delivered a series of lectures at the Agricultural and Mechanical College of Nebraska, upon the "Immunization of Northern Cattle," and the "Agricultural Possibilities of the South."

The demand for seed, cuttings, and rooted plants, by the farmers of the State has been fully met by the Horticultural Department of this station.

Station No. 3.

North Louisiana Experiment Station, Calhoun, La., had a season similar to the previous one described in my last report. The spring opened with favorable weather and rainfall. Crops grew luxuriantly only to be be seriously checked by a prolonged drouth in early summer. which materially reduced the corn fields and injured the tobacco crop. Subsequently, favorable conditions prevailed which produced a fairly good crop of cotton, and excellent hay crops and pastures Accordingly, stock of all kinds entered the winter in good condition.

Dwarf Essex rape has again afforded an excellent fall pasture. Oats and barley sown in early fall. afford splendid grazing all through the winter. and if stock be taken off in March produce good crops of grain. A variety of forage crops. corns. cottons and tobacco were grown during the past year. The dairy continues to be popular with the farmers and gives them a model for their home efforts. which nearly everyone is adopting. There are very few farms in North Louisiana without first-class butter. The dairy has Jerseys, Guernseys. Devons and Red Polls, and the merits of each as a breed, meeting the requirements of the small farmers of North Louisiana, are being tested. Experiments are being continued in varieties of sheep and hogs, testing adaptability to the wants of this hill country.

The young orchard on the station continues to do well and hopes are entertained of a full crop the present year.

The garden is still a feature of the station and is a valuable demonstration of the adaptability of this section to truck growing on a large scale.

Mr. W. R. Goyne, a graduate of the University, and who was announced in our last report as the successor of Mr. T. Ivy Watson as farm manager, resigned his position in July last, and in a few weeks thereafter was taken with typhoid fever and died. It is with deep regret that we chronicle the untimely death of this promising young man, so full of enthusiasm in his chosen profession of agriculture.

The great success in every way of the last Camp Meeting and Fair held at this station in October, was a source of much pleasure to all. A large attendance, an extensive and varied exhibit, a good premium list, and the best of order were the prominent features of the occasion.

STATE GEOLOGICAL SURVEY.

Having received an increased appropriation for this survey from the last legislature, the work has been greatly enlarged. Mr. A. G. Veatch, a former member of this survey, has made a thorough study of the subterranean waters of North Louisiana, South Arkansas and East Texas. This work has been accomplished at the joint expense of the United States Geological Survey and the State Survey. His report, which will throw much light upon artesian waters in North Louisiana, will be given to the public as soon as his work is completed.

Prof. G. D. Harris and Mr. E. F. Lines have been in the field since January 1st., investigating the oil resources of the State and studying the subterranean strata in which it occurs. Incidentally a large amount of valuable information relative to other subterranean resources has been obtained. Considerable enthusiasm in the oil developments of this State prevails, and a large number of wells are being bored in various sections, many of which will doubtless prove disastrous failures.

Mr. C. E. Smith has been engaged during the winter in studying the clays and lignites of the State. He has collected a large number of samples of clays and brick from many sections of the State, and will test the quality of the former in the station laboratory, and in the kilns of the Baton Rouge Brick Works, permission for which has been kindly granted by the generous proprietors. In examining the so-called lignites of the Dolette hills, he was surprised to find an immense bed of almost pure coal. The upper seam is 6 1-2 feet thick and easily workable. There are several seams below this, varying in thickness from five to seven feet. A ton of this coal has been sent us for trial and analysis. It was found to burn excellently well in stoves and closed grates. Its high content of water causes it to burn slowly at first in open grates. However, with a hot fire and a little artificial draught, it burns fairly well here.

A proximate analysis gives it the following composition: Moisture 35,55 per cent. Volatile Matter 30.28 per cent. Fixed Carbon 31.18 per cent, Ash 2.99 per cent, This sample is from the upper seam and only four or five feet from the surface. It is highly probable that deeper covering and lowering seams may produce a coal with much less moisture. Upon exposure a large amount of this moisture will evaporate and give an increased value to the residue. It will probably "slack" more or less on exposure. Experiments are now being conducted looking to the solution of these questions.

On account of the importance of this discovery, Prof. G. D. Harris and Mr. E. F. Lines have joined Mr. Smith and together they are making a complete investigation of the entire field. The results of their work will be given later in a bulletin.

Mr. Edwin Smith, of the United States Coast and Geodetic Survey, has been cooperating with the State Survey and has been during the winter engaged in determing the magnetic influences and establishing a permanent North and South line at the various parish seats. It affords me great pleasure to announce the full cooperation of the Police Juries of the various parishes with us in this work.

Through the generosity of the Bureau of Soils (Prof. Milton Whitney, Chief), of the Department of Agriculture at Washington, D C., a large area of the soils of Louisiana will be mapped The following schedule of work has been adopted for the present year:

Parish of Ouachita, January 1, to March 31.

An area of 200 square miles around New Orleans, April 1, to June 30.

Parish of East Baton Rouge, July 1, to Sept. 30.

Parish of Acadia, October 1, to Dec. 31.

Mr. Geo. N. Coffey and Mr. Rice began work on this schedule January 1st., and will continue throughout the year. They are making a complete soil survey and establishing lines of level by means of the plane table. The soils will be carefully analyzed physically and chemically, and their adaptability to certain crops as shown by analysis pointed out. Maps of the section will accompany the report.

The entire expense of this survey is borne by the United States Department of Agriculture, and the results of the work will be furnished the Geological Survey of this State.

A contract has been entered into between the Director of the United States Geological Survey and the Director of this station, by which a quadrangle included between 30o 30', and

31o latitude, and 91o and 91o 30' longitude shall be mapped upon a scale 1:125000, showing the courses of the drains, bayous, etc., hypsography and public culture, including location of farm houses, roads, towns, and county boundaries lines. The townships and sections of the land survey will be accurately given. The hypsography will be shown by contour lines with verticalintervals of 20 feet. The heights of important points will be determined and at least one permanent bench mark established in each township All outlines of wooded areas will be represented on the map. Upon the completion of the survey, the station will be furnished copies of the manuscripts and transfers from the copperplates of the maps for use in printing its own edition of said map.

This survey will begin March 1st and continue until finished, the work to be completed not later than January 1, 1904.

Since our last report another publication of this survey has been issued by Prof. G. D. Harris and Mr. A. C. Veatch. Seven thousand copies were published. The book is an octavo of 288 pages, besides numerous illustrations, and is very neatly printed and bound. The following subjects, all handsomely illustrated, are treated therein:

(1) The tertiary geology of the Mississippi embankment.
(2) The salines of North Louisiana.
(3) The geography and geology of the Sabine River.
(4) Notes on the geology along the Ouachita.
(5) Improvements in Louisiana cartography.
(6) The subterranean waters of Louisiana.
(7) The tides in the Rigolets.
(8) Oil in Louisiana.

The demand for the publications of the survey is very great, both from our home people and those seeking investments in this State. Copies are furnished free upon application to the Director of this station.

FARMERS' INSTITUTES.

The staff of the three stations has taken an active part in the Farmers' Institutes held last year in this State, several acting as Conductors.

The writer held three very successful institutes in the Sugar District, viz., Houma, Thibodaux, and Napoleonville, during the fall, all of which were largely attended, and great interest manifested.

ANALYSES OF FERTILIZERS AND PARIS GREENS.

The official work performed in the laboratory of the station during the past year has greatly increased.

3,001 samples of commercial fertilizers and 71 of Paris

Green, sent by the inspectors of the State Department of Agriculture, have been received and analyzed. This immense work required nearly the entire time of our whole force of chemists from January to July, and a part of them the rest of the year.

The last legislature included cotton seed meal (when used as a fertilizer) under the provisions of the Fertilizer Act, and the present year will therefore add still further to the work of this laboratory.

It is extremely gratifying, however, to know that such confidence is placed in our work that buyers and sellers effect contracts based upon our official analyses.

An immense bulletin of nearly 200 pages, embodying the results of this work, has recently been given to the public.

OTHER ANALYSES.

Besides the official work given above, the station has performed 37 analyses of waters, and 60 analyses of coals, ores, boiler scales, limes, cement and clays for the public.

IRRIGATION WATERS OF RICE FIELDS.

To determine the amount of fertility borne to the rice fields by the irrigating waters, and to compare those coming from rivers, bayous and wells, large number of waters were collected during the flooding season from the different rivers, bayous and artesian wells of Southwest Louisiana, and accurate analyses made of the same. This work is not yet complete. When finished the results will be given to the public.

STATION AND SURVEY ANALYSES.

Besides the above public work a large number of analyses incident to the regular work of the station has been made. Whenever opportunity has permitted, work on the soils of the State collected by the Geological Survey has been performed, and up to date over two hundred soils have been chemically analyzed, and over five hundred physically separated.

BULLETINS AND REPORTS.

Since our last report the following bulletins have been issued:

No. 66, Sugar Cane—Experiments in cultivation—26 pages.

No. 67, Broom Corn—"How to grow and cure it,"—14 pages.

No. 68, Home-grown versus Purchased Seed—32 pages.

No. 69, Pecans—40 pages.

No. 70, Cane Borer—42 pages.

No. 71, Report of North Louisiana Station, for 1901—28 pages.

No. 72, Forage Crops, Grasses. Clovers. etc., (in press)

No. 73. Analyses of Commercial Fertilizers and Paris Green (1902)—200 pages.

No. 74, Sheep and diseases of same (in press)

No. 75, Preservation of Syrups, etc (in Press)

Fourteenth Annual Report—12 pages.

Geological Survey Report, Part VI—288 pages.

The demand for bulletins has become so great that our entire mailing list has been carefully revised and extended. Fifteen thousand copies of each bulletin are now issued, and the labor of sending them off, even with the most approved modern facilities, is great.

SOUTH CAROLINA INTERSTATE AND WEST INDIAN EXPOSITION.

Charleston, S. C. Dec. 1, 1901--June 1, 1902.

By request of your Excellency, Major J. G. Lee and the writer, Commissioners to the Pan-American Exposition at Buffalo, N. Y., transferred at its close the Louisiana Exhibit to Charleston, S. C., where it was most tastefully installed by our assistant, Mr. Robert Glenk, in a space of 4,500 square feet.

The exhibit was greatly admired, and received the following awards: 32 gold medals, 16 silver medals, 23 bronze medals, 31 diplomas of honorable mention, and one special award for installation of exhibit. Louisiana Day was appropriately celebrated on the 27th March, with addresses from our distinguished citizens Judge Emile Rost, Dr. Fred J. Mayer, and Mr. Lucien Soniat, besides appropriate remarks from several invited guests.

At the close of this exposition, the entire exhibit was removed to New Orleans, where with your approval, it was turned over to the Progressive Union. It was handsomely displayed by Mr. Glenk in the room of this Union where it is attracting a large amount of interest, besides affording a valuable object-lesson of the wonderful resources of this great State.

Much of it will be used for the coming World's Fair at St. Louis.

STAFF OF THE STATION.

A few changes have taken place in the personel of the stations since our last report.

Messrs. G. W. Agee and T. D. Boyd, Jr., have resigned to accept more lucrative positions elsewhere. Their places have been filled by Mr. M. Esnard and Mr. R. E. Loudon, graduates of the Louisiana State University. Mr. Wm. D. Clayton resigned to accept a position elsewhere, and Mr. Robt. S. Washington has been appointed in his place. Mr. M. Bird, so long chemist at the North Louisiana Experiment Station, resigned last spring, and Mr. Simon Baum has been transferred from Audobon Park to fill his place. Dr. C. A. Browne, Jr., an expert in organic chemistry, has been added to the chemical force of the Sugar Experiment Station, and is engaged in studying the solids not sugar in the sugar cane and its products. We have already alluded to the resignation and untimely death of Mr. Wm. R. Goyne.

The following constitute the present staff of the stations:

SUGAR EXPERIMENT STATION No. 1.

Postoffice Audubon Park, New Orleans, La.

William C. Stubbs, Ph D., Director.
R. E. Blouin, M. S., Assistant Director and Chemist.
P. L. Hutchinson, B. S., Chemist.
C. A. Browne, jr., Ph. D., Chemist.
M. Esnard, B. S., Asst. Chemist.
R. E. Loudon, B. S., Asst. Chemist.
G. D. Harris, M. S., Geologist.
C. E Smith, Assistant Geologist.
E. F. Lines, Assistant Geologist.
George Chiquelin, Chemist and Sugar maker.
R. S. Washington, M. S. Farm Manager.
Jas. K. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION No. 2.

Postoffice, Baton Rouge, La.

William C. Stubbs, Ph. D., Director.
W. R Dodson, A. B., S. B., Asst. Director, Botanist and Bacteriologist.
C. E. Coates, Ph. D., Chemist.
H. A. Morgan. B. S. A., Entomologist.
F. H. Burnette, Horticulturist
W. H. Dalrymple, M. R. C. V. S,. Veterinarian.
B. H. Atkinson, Farm Manager.
H. Skolfield, Treasurer.

NORTH LOUISIANA EXPERIMENT STATION No. 3.

Postoffice, Calhoun, La.

William C. Stubbs, Ph. D., Director.
D. N. Barrow, B. S., Assistant Director.
Simon Baum, B. S., Chemist.

H Peevy, Farm Manager.
F. J. Watson, Horticulturist.
Travis McLendon, Dairyman and Poultryman.
C. H. Bumpass. Tobacconist

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30, 1902. It shows that expenditures have equalled receipts.

There is also given a supplementary statement of receipts from all sources and expenditures of every kind.

All of which is respectfully submitted.

WM. C. STUBBS. Director.

FINANCIAL STATEMENT.

1902	Cr	Dr.
The receipts from the Treasurer of the United States for the year ending July 1, 1902.		$15,000.00
By Salaries	$ 8,087.37	
Labor	3,221.53	
Publications	609.40	
Postage and Stationery	170 76	
Freight and Express	247.23	
Heat, Light and Water	239.35	
Chemical Supplies	275.00	
Seeds, Plants and Sundry Supplies.	422.50	
Fertilizers	158.09	
Feeding Stuffs	747.06	
Library	17.96	
Tools, Implments and Machinery	275.89	
Scientific Apparatus	53.97	
Live Stock	473.89	
	$15,000.00	$15,000 00

We, the undersigned members of the Board of Ariculture and Immigration, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending, June 30, 1902, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000.00, and the corresponding disbursements are $15,000.00, for all of which the proper vouchers are on file, and have been examined by us and found correct

(Signed) J. G. LEE,
Commissioner of Agriculture and Immigration.

WM. GARIG,
Vice-President Board of Supervisors and ex-Officio Member of Board of Agriculture.

SUPPLEMENTARY STATEMENT.

1902	Cr.	Dr.
To receipts from other sources than the United States, for the year ending July 1. 1902.		
To Balance, July 1, 1901,		$ 7,647.83
State Appropriation		15,000.00
Geological Survey		2,000.00
Fertilizer Fund		8,000.00
Farm Sales		1,866.05
Miscellaneous receipts		693.31
		$35,207.19
By Salaries	$11,465.69	
Labor	3,937.45	
Postage and Stationery	208.71	
Freight and Express	302.19	
Heat, Light and Water	351.65	
Chemical Supplies	336.13	
Seeds, Plants and Sundry Supplies	516.39	
Fertilizers	215.46	
Feeding Stuffs	913.08	
Tools, Implements and machinery	337.20	
Furniture and fixtures	138.15	
Scientific apparatus	65.98	
Live Stock	579.21	
Traveling Expenses	147.70	
Contingent Expenses	1,704.14	
Buildings and repairs	659.07	
Insurance	119.00	
Geological Survey	2,000.00	23,997.20
By Balance, July 1, 1902		$11,209.99

LIST OF PUBLICATION.

FIRST SERIES.

Bulletin ‡ No. 1—Organization of Sugar Experiment Station.
" ‡ No. 2—Manurial Requirements of Soil.
" ‡ No. 3—Experiments With Various Crops.
" ‡ No. 4—Results of Experiments With Oats
" ‡ No. 5—Results of Experiments With Sorghum.
" ‡ No. 6—Results of Experiments With Corn.
" ‡ No. 7—Field Experiments With Sugar Cane.
" No. 8—Experiments With Cotton.
" ‡ No. 9—Analyses and Valuation of Fertilizers.
" ‡ No. 10—Sugar House and Laboratory Work in 1886.
" ‡ No. 11—Experiments in Oats
" No. 12 Experiments in Sorghum.
" No. 13—Cotton and its Products.
" ‡ No. 14—Sugar Cane (field experiments).
" No. 15—Rice.
" No. 16—Potatoes, Tomatoes, Peas and Small Grains.
" No. 17—Ensilage.
" ‡ No. 18—Analyses of Commercial Fertilizers.
" No. 19—Sorghum, Field, Laboratory and House Results; Diffusion Process
" ‡ No. 20—Sugar Cane (field results)
" No. 21—Report of State Experiment Station, Baton Rouge, 1888.
" No. 22—Report of North Louisiana Experiment Station, Calhoun, 1888
" No. 23—Sugar Cane, Laboratory and Sugar House Results.
" ‡ No. 24—Rice and its by products.
" No. 25—Analyses of Commercial Fertilizers.
" No. 26—Report of State Experiment Station, Baton Rouge, 1889.
" ‡ No. 27—Report of North Louisiana Experiment Station, Calhoun, 1889.
" ‡ No. 28—Report of Sugar Experiment Station, 1889.

SECOND SERIES.

Bulletin ‡ No. 1—Commercial Fertilizers.
" † No. 2—Texas Screw Worm.
" ‡ No. 3—Report of Horticultural Department for Baton Rouge and Calhoun Stations.

Bulletin ‡ No. 4—Irish Potatoes; Results at Three Stations.
“ No. 5—Sugar Making on a Small Scale (reprint with additions)
“ No. 6—Sugar Cane (field experiments, 1890)
” No. 7—Report of State Experiment Station, Baton Rouge.
“ ‡ No. 8—Results of North Louisiana Experiment Station, Calhoun.
“ No. 9—Sugar Cane Borer and its Parasite.
“ ‡ No. 10—Systematic Feeding of Work Stock.
“ No. 11—Report of Sugar House and Laboratory, 1890.
“ No. 12—Commercial Fertilizers.
“ No. 13—Sweet Potatoes.
“ No. 14—Sugar Cane; Field and Laboratory Results.
“ No. 15—Report of Veterinarian for 1891.
“ No. 16—Results of North Louisiana Experiment Station, Calhoun.
“ No. 17—Report of State Experiment Station, Baton Rouge.
“ No. 18—Analyses of Commercial Fertilizers.
“ ‡ No. 19—Forage Crops, Grasses, Clovers and Small Grains.
“ ‡ No. 20—Tobacco Growing in Louisiana; Results at Calhoun.
“ ‡ No. 21—Results of North Louisiana Experiment Station, Calhoun, for 1892.
“ ‡ No. 22—Report of State Experiment Station, Baton Rouge, 1892.
“ No. 23—Analyses of Commercial Fertilizers.
“ No. 24—Sugar Cane; Field Experiments, Physical and Physiological.
“ No. 25—Tobacco at North Louisiana Experiment Station.
“ ‡ No. 26—Sugar Cane; Varieties of Cane and Striped Versus Purple.
“ ‡ No. 27—Horticulture at Baton Rouge, Calhoun and Audubon Park
“ No. 28—Report of State Experiment Station, Baton Rouge.
“ ‡ No. 29—Results for 1893, at Calhoun
“ No. 30—Sweet Potatoes (with illustrations.)
“ No. 31—Domestic and Commercial Fertilizers.
“ No. 32—Ramie, Uses, History, Composition, etc.
“ No. 33—Tobacco Growing in Louisiana, With Results at Calhoun.
“ No. 34—Cattle Feeding in Louisiana.

LOUISIANA STATE UNIVERSITY LIBRARY

Bulletin No. 35—Report of North Louisiana Experiment Station, Calhoun, 1894.
" No. 36—Horticulture; Results for 1894.
" No. 37—Windrowed Versus Standing Cane.
" No. 38—Chemistry of Sugar Cane and its Products.
" No. 39—Analyses of Commercial Fertilizers.
" ‡ No. 40—Cow Pea; Origin, Botanical Relations, Chemical Composition, Feeding Value, Restorative Virtues to the Soil, etc.
" No. 41—Tobacco; Results at Baton Rouge and Calhoun.
" No. 42—Horticulture; Results for 1895.
" No. 43—Bovine Tuberculosis in North Louisiana.
" ‡ No. 44—Charbon or Anthrax, with Experiences During Outbreaks in North Louisiana.
" No. 45—Analyses of Commercial Fertilizers and Paris Green.
" ‡ No. 46—Leguminous Root Tubercles.
" No. 47—Experiments in Corn, Cotton, Forage Crops, Tobacco, etc., at State Experiment Station, Baton Rouge.
" No. 48—Report of the Entomologist.
" No. 49—Commercial Fertilizers
" No. 50—Red Rice.
" ‡ No. 51—Cattle Tick and Texas Fever.
" No. 52—Horticulture; Results for 1896-1897.
" ‡ No. 53—Grasses, Clovers, Forage Crops, etc.
" No. 54—Analyses of Commercial Fertilizers and Paris Green.
" ‡ No. 55—Alfalfa, Spanish Peanuts, Unknown Cow Pea and Velvet Bean.
" ‡ No. 56—Ticks and Texas Fever.
" No. 57—Immunization Against Texas Fever by Blood Inoculation.
" No. 58—Analysis of Commercial Fertilizers and Paris Green.
" ‡ No. 59—Sugar Cane; Fields and Laboratory Results for Ten Years
" No. 60—Sharbon (Anthrax)
" No. 61—Rice; Preparation, Cultivation, etc.
" No. 62—Report of North Louisiana Epxeriment Station, Calhoun, for 1899
" No. 63—Analyses of Commercial Fertilizers and Paris Green.
" No. 64—Report of the Veterinarian.
" No. 65—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 66—Sugar Cane; Experiments in Cultivation.
" No. 67—Broom Corn; "How to Grow and Cure it."
" No. 68—Home-Grown Versus Purchased Seed.
" No. 69—Pecans and Pecan Culture.
" No. 70—Cane Boere (Diatroea Saccharalis)
" No. 71—Report of North Louisiana Experiment Station, Calhoun, for 1899.
" No. 72—Forage Crops. Grasses and Clovers.
" No. 73—Analyses of Commercial Fertilizers and Paris Green.
" No. 74—Sheep; Different Breeds, Internal Parasitic Diseases, etc.
" No. 75—Preservation of Cane Syrups; and Yeasts, Moulds, Bacteria and Enzymes.

SPECIAL BULLETINS.

The Orange and Other Citrus Fruits, from Seed to Market, With Insects Beneficial and Injurious, with Remedies for the latter. Sugar Cane, Vol. 1, History, Botany and Agriculture.

GEOLOGICAL BULLETINS.

Part 1. A Preliminary Report upon the Hills of North Louisiana, North of the Vicksburg, Shreveport and Pacific Railroad.
Part 11. A Preliminary Report upon the Hills of North Louisiana, South of the Vicksburg, Shreveport and Pacific Railroad.
Part 11. A Preliminary Report upon the Florida Parishes of East Louisiana, and the Bluff and Prairie Hill Lands of Southwest Louisiana.
Part 1V. A Preliminary Report upon the Bluff and Alluvial Lands of Louisiana.
Part V. Historical Review; General Geology; Special; Papers.
Part VI. Tertiary Geology of the Mississippi Embayment Salines of North Louisiana; Geography and Geology of the Sabine River; Notes on the Geology Along the Ouachita; Improvements in Louisiana Cartography; Subterranean Waters of Louisiana; the Tides in the Rigolets; Oil in Louisiana.

ANNUAL REPORTS.

1888. ‡ 1889, 1890, 1891, 1892, 1893, ‡ 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902.

BIENNIAL REPORTS.

‡ Vol. 1, 1886; ‡ Vol. 11, 1888; ‡ Vol. 111, 1890; ‡ Vol. 1V, 1892; ‡ Vol. V, 1894; ‡ Vol. VI, 1896; ‡ Vol. VII, 1898; Vol. VII, 898-900.

Reports and bulletins marked thus (‡) are out of print and cannot be supplied

SIXTEENTH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. AND M. COLLEGE.

FOR 1903.

TO THE GOVERNOR.

SIXTEENTH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. AND M. COLLEGE.

FOR 1903.

TO THE GOVERNOR.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE.

OFFICE OF STATE EXPERIMENT STATION.

BATON ROUGE, LA., JAN. 24TH, 1904.

To His Excellency, W. W. Heard, Governor of Louisiana:

SIR—In accordance with the provisions of Section 2, of the Act of Congress, to establish Agricultural Experiment Stations in connection with the colleges established in the several States under the provisions of an act approved July 2, 1862, and the acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations, including a statement of the receipts and disbursements, from July 1, 1902, to July 1, 1903.

STATION NO. I.

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS, LA.

The work of this station during the past year has been continued mainly upon lines given in previous reports. Investigations along field, laboratory and sugar-house lines of the sugar-cane have been continued with much success. The season just closed has been remarkably unfavorable for all kinds of crops. The winter was extremely wet, prohibiting farm work of all kinds; the spring was excessively dry, preventing that preparation of soil and planting of cane so essential to large production. For a few weeks in summer favorable seasons prevailed, followed immediately by a protracted drouth extending well into harvest. Under these conditions the cane crop was materially reduced in tonnage. It was, however, of fair sucrose content and thus in a measure compensated the low field yields.

By irrigation, however, the station to a very large extent, mitigated the severity of the seasons. An early irrigation in spring placed our soils in excellent tilth, and two subsequent irrigations pushed forward all of our crops and prevented damage from the early drouth. The cane should have been irrigated again in the fall, but the frequent threatening of rain during the month of September caused almost daily a postponement of the intention to irrigate until finally it was deemed too near harvest to perform such a risky operation.

Accordingly the final yield was materially reduced by this prolonged fall drouth. However, in comparison with the average yields of the State, our results were quite satisfactory.

Again favorable results have been obtained in both the field and sugar house from seedlings Nos. 74 and 95. These canes have been supplied to a large number of planters in this State, and sufficient time having elapsed for them to judge of their merits, it was deemed of value to the sugar interests of the State to collect and correlate their experiences and opinions. Accordingly, a set of questions was sent to each in a circular letter, and the replies received, together with the results obtained on this station, have been made the basis of a communication to the Sugar Planters' Association, by my assistant, Mr. R. E. Blouin, and will later form the subject matter of a special bulletin.

It is gratifying to note the universal esteem of these seedlings, particularly D. No. 74, and the rapidity with which they are displacing other canes in this State.

It may here be remarked that T. No. 111 and T. No. 189, seedlings respectively of D. No. 74 and D. No. 95, have been this year grown in field experiments. T. No. 111 is a small cane, but exceedingly rich in sucrose, this year giving 17.2 per cent, for plant and 18.5 per cent. for stubble. T. No. 189 is a cane of fair size and sugar content. Both are continued in cultivation with the hope that they will prove valuable additions to our fields.

The station is paying unusual attention to the proper preparation of the soil and the fertilization and cultivation of the cane, since it is realized that only by the practice of the best and most economical methods can our planters successfully withstand such adverse seasons as have prevailed during the past four or five years.

The recently enacted reciprocity treaty of this country with Cuba promises a vigorous development of the sugar industry in the "Gem of the Antilles," and with it a depreciation of present values. To successfully meet this strong competition every known economy must be practiced by our planters.

Dr. C. A. Browne, Jr., has continued his laboratory investigations of the sugar cane. Special attention has been paid to a study of the insoluble carbohydrates of the cane, likewise to the composition of cane fibre and its utilization for paper making. The commercial manufacture of paper from bagasse has thus far not proved a pronounced success, as large losses of fibre are entailed with present processes. This is to be lamented, as cane fibre has most superior paper-making qualities. A process, however, has recently been patented by which all losses of fibre are prevented and a small practical test by a modern paper company has shown that bagasse is capable of being worked up into the very finest grades of paper, some of which can bring as high as $300 a ton. A similar test is now being conducted on a larger scale, and if the results prove successful we may hope for the establishment of several paper mills in the sugar producing sections of our State.

Among other laboratory investigations, the action of enzymes, or natural ferments, during the ripening and windrowing of cane, and the concomitant changes in the composition of the juice have been studied. The losses from the fermentation of cane juice, by yeasts, moulds and bacteria, have also been investigated. During the past grinding season several different methods of extraction were tested, with special reference to the composition of the juice from each mill. The station has also recently taken up the study of another very important question bearing upon the sugar industry, viz.: That of the composition and feeding value of mixed feeds containing molasses. The manufacture of these feeds is attracting much attention at present, and the industry gives promise of assuming considerable importance, since it offers our planters a greater market for their surplus molasses, as well as a more convenient means of feeding this by-product.

ORANGE CROP.

Greatly to our disappointment, the hybrid orange trees in our orchard, crosses between the hardy trifoliata and the edible oranges, failed last year to fruit. The success obtained elsewhere emboldens us to hope for an edible fruit from some of our numerous trees in the near future.

FIBRE CROPS

are still grown on this station, but in reduced areas, since the successful decoraticating machine, so long promised by inventors, has not yet appeared.

COTTONS.

It is with deep regret that we have to chronicle the destruction last summer of all the varieties of cotton grown on this station. Some miscreant placed in our field the Mexican boll weevil, and to successfully exterminate it when found in August last it was deemed necessary to destroy every stalk of cotton on the station. The cottons were pulled up by the roots, immersed in petroleum and burned. The fallen bolls and squares were carefully picked up, saturated with petroleum and also burned. Petroleum was sprinkled over the soil, after which the latter was carefully plowed, harrowed, rolled and oiled, reharrowed, rerolled and reoiled. Then the land was flooded and kept under water for five days. The weevils were thus exterminated, but at a great sacrifice and large cost. Nearly one hundred varieties, secured from Egypt, India, Japan and this country, at a great cost of time and money, were destroyed in a few days.

Pedigreed cottons upon which the labor of years had been devoted in order to combine productiveness with excellence of staple and vigor of growth, were consigned with the rest to the flames.

FORAGE CROPS.

Experiments have been continued with most of the crops reported last year. Some few new plants were tried. While many forage crops can be grown here successfully, none are equal in quality and quantity produced to that peerless plant, alfalfa, which should be grown upon every farm and plantation in the State. Upon the alluvial lands it will grow well without inoculation. A thorough preparation of the soil and a successful seeding in October is all that is needed to insure fine crops in these soils. Elsewhere heavy fertilization, with inoculation, may be required before good crops can be secured. Bulletin No 72 on forage crops, recently issued by the station, gives full directions for the planting and harvesting of this crop.

SUGAR SCHOOL.

During the past fall twelve students from the Audubon Sugar School of the Louisiana State University were given instruction in practical work by lectures and experiments in the field, laboratory and sugar house.

It is to be regretted that the demand for trained scientists is so great and the salaries offered so large, as to induce many of these students to enter into commercial work before finishing their regular course.

STATION NO. 2.

State Experiment Station, Baton Rouge, La., continues to perform most excellent work under the direction of Prof. W. R. Dodson.

Experiments in the proper fertilization of corn and cotton have been continued. A large number of varieties of corn and cotton were tested and samples of each have been procured for the Louisiana State exhibit at the World's Fair in St. Louis.

A number of forage crops have been grown for the purpose of supplying the large and valuable herds of Hereford and Polled Angus cattle with feed.

BEEF CATTLE IN CHICAGO MARKET.

Mention was made in our last report of the grade Aberdeen Angus calves bought in November, 1901, in Illinois, and successfully immunized. It was then stated that the steers, sixteen in number, were being fed upon the by-products of our three great staples, viz., cotton seed meal, rice bran and molasses, with a view of preparing them for the Chicago market. It is a great pleasure to report further that these steers were during the past winter "finished up" for the market and sold on January 8 in Chicago at the top price for the week, fetching $5.65 per hundred pounds. It required six days to transport the carload of steers from Baton Rouge to Chicago. This delay in their journey, added to inadequate feed and water during the trip, and the very severe weather encountered, caused a reduction in weight and a slight decline in price. However, the results were very gratifying, and proclaimed to the world that as good beef could be produced upon the comparatively cheap by-products of this State, as upon corn raised upon the prairies of Illinois and Iowa, with their famous blue grass pastures thrown in. In addition to a balanced ration of cotton seed meal, rice bran and molasses, these animals were grazed upon the pastures in spring and summer and fed ad libitum upon the hay grown upon the grounds of the station. This sale in Chicago has attracted the attention of many Western feeders and elicited comments from nearly every Northrn agricultural journal.

The station will undertake the feeding of a lot of steers, raised below the quarantine belt, at an early date, and hopes to prove conclusively to all concerned that beef cattle can be more economically and profitably produced in Louisiana than elsewhere.

DIGESTIBILITY OF RICE BRAN AND POLISH.

Mention was made in our last report of the experiments then being conducted of determining the digestibility of rice bran and polish. These experiments were brought to a successful conclusion and the results embodied in Bulletin No. 77, just issued. A fact was brought out in these experiments which was not sought, because it was not suspected. It was a valuable revelation, however, and the strong hand of the law may be invoked to suppress its future existence. It was found that it was a common custom of the rice mills in this State to grind up the hulls of the rice and mix the same with the bran. In many instances this adulteration reached 50 per ct. of the total feed. By the new process of milling rice it is claimed that a small quantity of hulls necessarily finds its way into the bran, but so large a quantity as 50 per cent. can only be accounted for by mixing of the two with the intention of fraud. Rice hulls are not only of no nutritive value, but absolutely injurious from a physiological standpoint, greatly injuring the mucous linings of the stomach.

In connection with the investigations upon bran and polish, it was observed that the high percentage of oil in the same had a bad effect upon the properties of the feeds. The oil speedily becomes rancid, thus rendering the feed unpalatable to the animal; in addition to this defect, the oil diminishes the digestibility of the feed and also exerts a purgative action upon the bowels, if the bran is fed in large amounts. To remedy these defects in the rice feeds it is proposed to remove the excess of oil. Co-operative experiments are at present conducted by the Experiment Station with the Pratt Cereal Mill Co., of Decatur, Ill. It has been found that the rice bran is much improved in quality after removing the excess of oil and does not become rancid. The oil which is obtained has a considerable commercial value which will more than pay for the process of its removal. The outlook is so favorable that we may soon look for the establishment of several mills in Louisiana for the extraction of rice oil and the manufacture of improved feeds from rice. There is every reason to believe that such improved feeds can replace to a large extent the corn and wheat products which are now being shipped into our State from the North and West.

TOBACCO.

During the past year experiments in growing Havana and Sumatra tobacco in the open and under half shade, have given good results.

This tobacco, after being carefully cured, is now being manufactured into cigars, which have been pronounced by experts to be of good quality. Both the tobacco and cigars will be shown in the Louisiana exhibit at St. Louis.

During the past year Prof. H. A. Morgan has continued his valuable experiments with various mixtures for spraying cattle with a view of killing the ticks and of repelling the horn-fly, both serious obstacles to the welfare of stock in the summer.

Since our last report the Mexican boll weevil has made its appearance in several localities in the western portion of this State (Sabine Parish). A crop pest commission has been created by the Legislature, with authority to deal with this and other pests to our crops. The director of the station and the station entomologist are made "ex-officio" members of this commission. Prof. Morgan at a late meeting was made entomologist and secretary of this commission, and has vigorously entered upon his duties. His headquarters have been temporarily located at Shreveport, and with his assistants and inspectors is now preparing a vigorous campaign for keeping the weevils out of this State.

Dr. W. H. Dalrymple has, during the past year responded to many public calls for stamping out contagious and infectious diseases. He has also continued his investigations of the nodular worms in sheep, and has shown that infected pastures may be cleaned by a careful rotation of crops. A bulletin now in press will give results of his investigations. Dr. Dalrymple has been again honored by a re-election as vice-president of the National Veterinary Association of America.

The Horticultural Department has supplied an exhibit of fruits and vegetables for the Louisiana exhibit at the Louisiana Purchase Exposition, St. Louis.

STATION NO. 3.

North Louisiana Experiment Station, Calhoun, Louisiana, had upon the whole a fairly good season. The spring was late and dry, reducing the earlier crops. The cotton crop was, however, fair, and the prevailing prices for this staple made its culture last year quite remunerative. Field experiments with corns, cottons, forage crops, small grains and tobacco were conducted. Twelve varieties of wheat were again successfully grown, and the fact has been demonstrated that upon the red lands of North Louisiana this cereal could be profitably grown, provided a near market could be found for its sale, or factories could be established in various localities where it could be made into flour.

Rust-proof oats and barley sown early in October, afford an excellent pasture for stock during the winter, and if they be withdrawn early in March, fair crops of oats and barley will be produced.

Dwarf Essex rape also affords a valuable fall and winter pasture. Alfalfa, red and crimson clovers, planted with care in October, will furnish cuttings of most nutritious hay. Crimson clover yields only one crop; red clover frequently two or more, while alfalfa, when well established and carefully harvested, will last for years, affording four to five crops per annum. A number of saccharine and non-saccharine sorghums can be successfully grown in this section, affording two or more cuttings per year. Cow peas, velvet beans and Spanish peanuts are largely grown and furnish, when well cured, most valuable forage. A vast array of forage and grazing crops can be grown here, both in winter and summer, and with them, supplemented by cotton seed, or preferably, cotton seed meal, stock of all kinds can be profitably grown—beef and mutton for home and Western markets, hogs for local consumption, and mules and horses for home use. Besides, dairying as already fully demonstated by our model dairy, could be made a valuable adjunct to many farms. The station has the following breeds of cattle; Jerseys, Guernseys, Devons and Red Polls, and the increase, especially in the male line, is supplied to the farmers of North Louisiana at reduced prices. It has on hand now, young bulls of the following breeds, Jersey, Devon and Red Poll.

The following breeds of hogs are grown, Berkshire, Poland China, Essex and Red Jersey. The pigs from these breeds are sold to the farmers of the State at low figures.

Of the following breeds of sheep experimented with, viz., Dorset, Shropshire, Southdown and Merino, the last appears to succeed the best. Stomach worms, the great enemy of sheep raising, have been very destructive of our flocks. The Merino breed seems to be the most resistant to the attacks of these insects.

By a frequent change of pastures or giving an extensive range for grazing, these parasites are greatly reduced.

The young orchard on the station is growing finely, though the season was destructive of the fruit crop last year. It is hoped that a favorable season the present year will give us abundant fruitage and afford an opportunity of studying the different varieties under cultivation.

TRUCK GROWING.

Considerable interest has been developed in the "truck" industry in this section, and the garden will accordingly be expanded the present year to meet this interest. Truck growing upon a somewhat enlarged plan will be conducted with the leading vegetables, in order to test the yields per acre and the prospective profits of this industry.

TOBACCO.

A fine crop of yellow leaf tobacco was grown the past year. It has been clearly demonstrated that this type of tobacco can be successfully grown upon the hill lands of North Louisiana, and only local factories are needed to induce an extended cultivation of this plant. The impetus given to the cultivation of this plant years ago, was checked by the burning of the factory located at Calhoun, but this factory was in existence sufficiently long to demonstrate the excellence of the tobacco grown and the willingness of the farmers to grow it within the reach of local factories. Fine samples of the tobacco grown last year will be exhibited in the State exhibit at the Louisiana Purchase Exposition.

North Louisiana Agricultural Fair and Camp Meeting continues to hold its annual session of three days in the fall of each year. Last year it was held on November 4, 5 and 6, and was well attended, particularly on the second day. The exhibits were good and fairly numerous. The best of order prevailed and everybody enjoyed the occasion.

STATE GEOLOGICAL SURVEY.

Prof. G. D. Harris, aided by Mr. A. Reinecke, is now in the field completing the work necessary for furnishing the biennial report, which will be issued early in April. This report, besides giving the general geology of the State, will deal specially with the subterranean waters and oil deposits of this State. Very valuable data have been obtained from the logs of the wells dug all over the State which has served to more clearly elucidate the geological history of the State.

The lignitic beds mentioned in our last report, will be fully treated in this volume. Already these beds have attracted the attention of the capitalist, and it is now believed that they will be developed and worked in the near future.

CO-OPERATION OF UNITED STATES COAST AND GEODETIC SURVEY.

For several years past the United States Coast and Geodetic Survey has been co-operating with this survey in determining the magnetic influences and establishing a permanent North and South line at the various parish seats. Mr. L. B. Smith is now at work, and contemplates completing it early in March. When completed, every parish in the State will have a permanent North and South meridian, from which the surveyors can easily determine the variation of their magnetic needles. With increasing values of land all over the State, the question of exact meets and bounds becomes prominent, and accurate surveys are now everywhere demanded. Each parish surveyor has now a ready reference for the estimation of the variation of his needle. It has been found that this variation is almost the reverse of that found further east.

This survey is under obligations to the numerous police juries for the readiness with which they supplied the necessary materials, and other valuable co-operation.

SOIL SURVEY.

Allusion was made in my last report to the generosity of the Bureau of Soils (Prof. Milton Whitney, chief) of the Department of Agriculture, Washington, D. C., in assigning us a corps of men to make a soil survey of this State. The schedule given in my last report, slightly modified, has been fully carried out. Prof. T. D. Rice, with his assistants, has surveyed and mapped during the past year, the entire parishes of Ouachita and Arcadia, and 400 square miles around New Orleans. Mr. Rice has been supplanted by Mr. Jones, who with assistants, is now making the survey of De Soto parish. This survey will continue its work during the present year, going into other parishes after completing De Soto. The soils of each paraish are classified, carefully analyzed chemically and physically, and the adaptability of each type to certain crops, as shown by examination, pointed out. Maps of the parish surveyed will accompany the report.

The entire expense of this survey is borne by the United States Department of Agriculture, and the results of the work furnished our State Geological Survey.

UNITED STATES GEOLOGICAL SURVEY.

Mention was made in our last report of a contract made by the director of this station with this survey, by which a quadrrangle included between 30° 31′ and 30° latitude and 91° and 91° 30′ longitude, shall be mapped out upon a scale of 1:125000, showing the courses of the drains, bayous, etc., hypsography and public culture, including location of farm houses, roads, towns and country boundaries. The townships and sections of the land surveyed will be accurately given. The heights of important points will be determined, and at least one permanent bench mark established in each township. All outlines of wooded areas will be represented on the map. Upon the completion of the survey, the station will be furnished copies of the manuscripts and transfers from the copperplates of the maps for use in printing its own edition of said map.

This survey began in March 1903, and the following preliminary report made by Charles D. Walcott, director of the United States Geological Survey, shows the work done to date:

"DEPARTMENT OF THE INTERIOR, UNITED STATES GEOLOGICAL SURVEY.

" WASHINGTON, D. C. JANUARY 27, 1904.

"Dr. Wm. C. Stubbs, Director,
Louisiana Experiment Station,
Audubon Park, New Orleans, La.

" SIR:—I have the honor to make the following preliminary report of the results of the co-operative topographic survey conducted in the State of Louisiana during the year 1903. This work was prosecuted under an agreement signed by you February 16, 1903, and by me February 13, 1903, whereby it was agreed that not more than $2500 was to be expended by you towards the co-operative work, to be met by a like sum by me on behalf of this bureau, all expenses to be balanced not later than July 1, 1904.

"Under the direction of Mr. J. H. Renshawe, geographer, field work was commenced in March on the Bayou Sara quadrangle, lying in portions of the parishes of East Baton Rouge, West Baton Rouge, Pointe Coupee, East Feliciana and West Feliciana, and continued through May. It was again resumed in September, 1903, under the general direction of Mr. H. M. Wilson, geographer, under whose supervision the field work of the central section had in the meantime been placed. This latter work extended into the Baton Rouge quadrangle, which is included in portions of the parishes of Ascension, Assumption, Iberia, St. Martin, Iberville, East Baton Rouge and West Baton Rouge.

"In view of the great detail encountered in mapping the topography in the northern portion of the area under survey, the total funds allotted were exhausted early in November, 1903. I therefore allotted an additional $2500 from the funds of this bureau, thus making a total of $7,500 allotted to this work, of which this bureau provided $5,000. With these additional resources field work was continued until the close of December, when it was temporarily disbanded during the colder months of the winter.

"From the expenditures made there has resulted 81 miles of primary traverse for the control of one atlas sheet, covering an area of 1025 square miles.

"In addition to the above primary control there has resulted an accurate map on a scale of 1:125000 and with a contour interval of 20 feet, of 486 square miles of the area of the State, 401 of which lie within the Bayou Sara quadrangle, on which 690 miles of spirit levels were run, in the course of which 16 permanent bench marks were established and 1761 elevations determined. In addition there were run 2014 miles of traverse, at an expenditure for field work alone of $3775. In addition to the work above mentioned on the Bayou Sara quadrangle there were mapped 85 square miles of the Baton Rouge quadrangle; there were run 173 miles of levels, in the course of which 1 permanent bench mark was established and 435 elevations determined.

"There were run 290 linear miles of road traverse. The cost of field work alone on this sheet has been $850. The results will be published on parts of the two sheets above named.

"Besides the final mapping mentioned the remainder of the Bayou Sara quadrangle, covering 624 square miles, was completely traversed, levelled and adjusted, and is ready to be sketched.

"The total expenditure by the State funds to date of January 15, 1904, has been $2,840, leaving a balance of State funds to the amount of $20. The total expenditure by the Federal Bureau to the same date has been $3,737, leaving a balance of $3,763 to co-operative work. There will remain at the beginning of the next field season an estimated balance of $600, the remainder being needed for office salaries and drafting during the coming winter."

"Very respectfully,

(Signed) "Chas. D. Walcott,
"Director."

The demand for the publications of the survey is very large, both from our home people and from prospective settlers and investors. Copies are furnished free upon application to the Director of the station.

FARMERS' INSTITUTES.

The staff of the three stations has taken an active part in the Farmers' Institutes held since my last report.

ANALYSES OF FERTILIZERS AND PARIS GREEN.

The official work performed in the laboratory of the station during the past year has again increased, 4,240 samples of commercial fertilizers, and 83 samples of Paris Green sent by the inpectors of the State Department of Agriculture, having been received and analyzed. This work has been greatly increased by the inclusion of cotton seed meal (when used as a fertilizer) under the provisions of the Fertilizer Act. It required a number of chemists to satisfactorily dispatch it. A bulletin giving the results of this work has been issued.

OTHER WORK.

Besides the official work given above the station has performed 95 analyses of the following substances:

Waters	23
Lignite and coal	3
Cotton seed oil	2
Rice bran and polish, molasses foods, and other food products	21
Miscellaneous	46

In the analyses of the rice bran there has been found in every instance a large percentage of rice hulls, added as a filler, materially reducing the food value of the bran, and besides this the presence of these hulls are very injurious to the digestive organs of the animal, and may cause the loss of the animals. In a number of these analyses over 50 per cent. of hulls were found in the bran, thus reducing its value 50 per cent., and at the same time rendering it a dangerous stock food. State inspection of these food products should be obtained in order to remove this dangerous practice and imposition. An inspection law, similar to the fertilizer law now in operation, seems to be an urgent necessity in order to protect purchasers against fraud in feed stuffs. The markets are flooded with various compounds, claiming to furnish the highest nutrition in the best available forms, and their real value can only be determined by analysis. Our next legislature will doubtless be called upon to enact legislation necessary to protect our planters and farmers from fraud.

LOUISIANA PURCHASE EXPOSITION.

It was determined by the last Legislature to make a presentation of Louisiana's resources at the centennial celebration of the Louisiana Purchase in St. Louis during the present year. A commission, consisting of your Excellency, Col. Charles Schuler of De Soto, Judge Emile Rost of St. Charles, Hon. Henry L. Gueydan of Vermillion, and Maj. J. G. Lee, Commissioner of Agriculture, Baton Rouge, met early in last year and elected the director of the stations as State Commissioner, and Mr. Robert Glenk as Assistant to the Commissioner.

Since that time a large portion of the time and energies of the director has been spent in collecting the exhibits and arranging for their proper installation at St. Louis.

Very gratifying results have been obtained. A replica of the Cabildo or Supreme Court building in New Orleans, in which the actual transfer of Louisiana from the French to the United States took place, has been erected on the World's Fair grounds at St. Louis, to be used as a State building. It will be furnished with antique furniture of Colonial and Empire styles, and in its front will be a reduced reproduction of Jackson Square (the old Place d'Armes). Exhibits will be made in the following buildings. Agriculture, Horticulture, Forestry, Fish and Game, Education, Mines and Minerals, Liberal Arts, Transportation, and Archaeology.

In agriculture will be presented complete exhibits of the processes for preparing for market our three chief staples, sugar, rice and cotton, together with all of their products.

A complete model, upon a scale of one inch to the foot, of a sugar house capable of working 1,000 tons of sugar cane per day, has been secured. The following are the contributors:

B. F. Avery & Sons, model plows, cultivators, etc.
Baldwin Locomotive Works, 1 model locomotive.
T. J. Howard, 1 cane loader.
Bodley Manufacturing Co., 1 cane feeder.
Whitney Iron Works, 1 mill with shredder, engines and carriers.
Sterling Boiler Works, 1 battery of boilers.

Wm. B. Perrin & Co., 1 set mud filter presses.

John H. Murphy, sulphur machine and tank, lime tank, juice and syrup tank, clarifiers, brush pans, triple effects, and vacuum pans.

S. S. Hepworth & Co., mixer and five centrifugals.

Whitney Iron Works, crystallizer.

Hersey Granulating Co., granulator.

A wax cane field, showing the field in all conditions, from the planting of the cane to the harvesting of the same, cars, barrels of sugar and molasses have been provided by the Commission. Over all of this machinery will be an up-to-date sugar house, built also at the expense of the Commission. To the above will be added all the commercial samples of molasses and refined and unrefined sugars (furnished by the Sugar Exchange, and American Sugar Refinery) candies, alcohols, vinegars, etc. A sugar laboratory and samples of cane, etc., complete the sugar exhibit.

In the Rice Exhibit, will be a rice field in all stages, from the preparation of the soil to the harvesting of the matured rice. A complete rice mill made by Boland & Gschwind; a complete pumping plant made by A. M. Lockett; rice plows and wagons by John Deere Co.; a rice drill by Monitor Drill Co.; a rice harvester by International Harvester Co.; a thresher by Case Manufacturing Co.; two rice warehouses, sacks of rice, etc., complete the outfit. The following have contributed also to the Rice Exhibit:

Kahn & Co., rice products and by-products.

M. C. Mevers, rice in sheaf.

In the Cotton Exhibit are a number of bales of cotton kindly loaned by progressive citizens over the State. A carnival King Cotton, a saw gin, a roller gin; a complete oil mill furnished by the Buckeye Iron & Brass Works; a square cotton press; a Lowry press, and a number of round bales of cotton; and products of the oil mill and cotton factory.

Besides these exhibits in the three staple crops, there will be included a fine general agricultural and vegetable exhibit.

HORTICULTURE.

Will consist of all of the fruits of the State, both preserved and fresh. A large display of pecans, oranges, grape fruit, etc. A number of orange and grape fruit and pecan trees will be exhibited in boxes. Also bananas, figs, pineapples, pomegranates, growing in boxes will be in evidence. In the floral display will be a handsome collection of palms and other rare plants.

FORESTRY.

Every tree of our forests will be presented in the form of a log, and at the same time in boards polished and unpolished. The products of the forest covering every article known to be made in the State have been secured, together with highly polished doors, mantels, etc., of our cypress and pines.

FISH AND GAME.

A contract has been made to furnish every bird, fish and animal found in Louisiana, and the progress so far made gives token of a compliance with the contract.

EDUCATION.

Many of the public schools, some of the private schools, and nearly all of the higher institutions of the State, have furnished creditable exhibits for this department.

MINES AND MINERALS.

Sulphur and salt in goodly quantities, petroleum from every well in the State, refined products of petroleum from our local refinery, coal from DeSoto, marble from St. Landry and Winn, sandstone from Natchitoches, iron ores from Lincoln, clays, bricks, etc., constitute our exhibit in this building. A heroic statute of Mephistopheles, and a Cleopatra's Needle twelve feet high, both of sulphur, and Lot's Wife of salt, will be attractive features.

LIBERAL ARTS.

Topographical maps of New Orleans in 1803 and 1903 have been prepared. The former is two feet square. The latter is 15 feet square, and shows clearly the streets, public buildings, railroad approaches, elevators, wharves, river front, etc. A topographical map of the levees of the State is 35 feet long and 40 inches broad and shows in detail the vast extent of levees in the State, and the relative height of same. A number of maps showing the Louisiana Purchase extending from the year 1500 up to the present time, and a number of rare old books, will be exhibited here, through the kindness of Mr. William Beer, of the Howard

Memorial Library. A working model of the Algiers Dry Dock has been prepared for the Louisiana Exhibit by the Maryland Steel Company, the builders of the dry dock.

TRANSPORTATION.

In this building will be presented transportation on the Mississippi River, past and present. Beginning with the pirogue, the flatboat propelled by oars, the sail vessel, the original steamboat, the Mississippi steamer and the large ocean steamship are all shown in handsome models. The Southern Pacific Co., the Leland Line, The Harrison Line, The Copenhagen Line, and the Mexican Steamship Co., have all furnished models of steamers that at present are engaged in the trade of New Orleans.

ARCHAEOLOGY.

A select collection of Indian relics, baskets, etc., will be exhibited in this building.

TOPOGRAPHICAL MAPS OF THE STATE.

Under the auspices of the Geological Survey of the State, three large topographical maps of the State have been prepared. One will show the geology of the State and location of minerals, oils, etc.

Another will show the argiculture of the State, the different areas devoted to the different crops, etc.

The third will show the forestry, clearly delineating the long leaf pine, the short leaf pine, the cypress and the hard-wood areas of the State.

The first will be in the Mines and Minerals Building. The second in the Agricultural Building. The third in the Forestry Building. These maps are costly and exceedingly valuable for the information they convey.

I have gone somewhat into detail in giving the above, in order that some idea may be obtained of the magnitude and quality of this collection.

At the end of this exposition, this collection should be kept together and form the nucleus of a State Industrial Museum. A large and well ventilated building should be secured where these exhibits could be displayed and where both the citizens of this

State and the stranger within our gates, could in a short while see the products of our State and form some idea of the immense resources of Louisiana. This museum should have for its curator, a naturalist of decided ability, and should be maintained by the State, and opened at all reasonable hours for the inspection of visitors. Such a museum centrally and suitably located in New Orleans, would do more to advertise the State than any other single agency. Besides, it would furnish material for future fairs and expositions.

STAFF OF THE STATIONS.

Since my last report several changes have taken place in the personel of the stations. Prof. H. A. Morgan, who has heretofore filled the positions of Professor of Entomology in the Louisiana State University, and entomologist to the stations, has on account of the increased duties of the latter position, resigned the former and will hereafter devote his entire time to station work. Messrs. Esnard, Loudon and Taylor have resigned to accept more lucrative positions. Their places have been filled by T. W. Holmes, of Mississippi, Geo. H. Hardin, of Maryland, and Jas. E. Halligan, of Massachusetts, three good men. Mr. R. S. Washington has been succeeded by Mr. D. L. Williams, of Georgia, as Farm Manager. Mr. C. E. Smith on account of bad health, has resigned, and Mr. E. Reinecke is now Assistant Geologist. Mr. Geo. Chiquelin has been granted a leave of absence for five months, to superintend a large sugar house in Cuba, during the grinding season. Mr. Simon Baum has resigned as chemist of the North Louisiana Experiment Station, and entered upon private enterprises. Mr. H. Peevy has been succeeded by Mr. Ivy Watson, as Farm Manager at Calhoun. Mr. Watson was previously connected with this station in this capacity and performed satisfactorily its duties. Mr. Travis McLendon has been succeeded by Geo. H Malone as dairyman at Calhoun.

The position of tobacconist has not yet been filled.

It may here be remarked that so great is the demand for graduates of our own University, that it has been found impossible to employ enough of them to fill the vacancies as they occur on the stations. Larger salaries with prospects of future promotion, and private enterprises of an attractive character lure them into other fields.

The demand for the publications of the stations has grown beyond our capacity to supply. Ffteen thousand copies are issued of each bulletin and our regular mailing list absorbs most of these, leaving but few for future applicants. Applications from other States and foreign countries to be placed on our mailing list are received almost daily. Many of these we are compelled to decline on account of the limited supply. Again, several of our popular bulletins have had to be re-written and re-published in order to meet the demand for the information which they contained. In one instance, a third edition has been issued.

The following constitute the present staff of the stations:

SUGAR EXPERIMENT STATION NO. 1,

Postoffice, Audubon Park, New Orleans, La.

William C. Stubbs, Ph. D., Director.
R. E. Blouin, M. S., Assistant Director and Chemist.
P. L. Hutchinson, B. S., Chemist.
C. A. Browne, Jr., Ph. D., Chemist.
Geo. H. Hardin, B. S., Assistant Chemist.
T. W. Holmes, B. S., Assistant Chemist.
Jas. E. Halligan, B. S., Assistant Chemist.
G. D. Harris, M. S., Geologist.
E. F. Lines, Assistant Geologist.
A. Reinecke, Assistant Geologist.
Geo. S. Chiquelin, Chemist and Sugarmaker.
D. L. Williams, Farm Manager.
Jas. K. McHugh, Secretary and Stenographer.

STATE EXPERIMENT STATION NO. 2,

Postoffice, Baton Rouge, La.

William C. Stubbs, Ph. D., Director.
W. R. Dodson, A. B., S. B., Assistant Director, Botanist and Bacteriologist.
C. E. Coates, Ph. D., Chemist.
H. A. Morgan, B. S. A., Entomologist.
F. H. Burnette, Horticulturist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
B. H. Atkinson, Farm Manager.
H. Skolfield, Treasurer.

NORTH LOUISIANA EXPERIMENT STATION NO. 3,

Postoffice, Calhoun, La.

William C. Stubbs, Ph. D., Director.
D. N. Barrow, B. S., Assistant Director.
Ivy Watson, Farm Manager.
E. J. Watson, Horticulturist.
——————, Tobacconist.
Geo. H. Malone, Dairyman.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch Bill for the fiscal year ending June 30, 1903. It shows that expenditures have equalled receipts.

There is also given a supplementary statement of receipts from all sources and expenditures of every kind.

All of which is respectfully submitted. Wm. C. Stubbs,
Director.

FINANCIAL STATEMENT.

1903.	Cr.	Dr.
The receipts from the Treasurer of the United States for the year ending July 1, 1903		$15,000.00
By Salaries	$ 7,120.51	
Labor	3,196.33	
Publications	1,423.50	
Postage and Stationery	383.01	
Freight and Express	205.39	
Heat, Light and Water	226.90	
Chemical Supplies	86.54	
Seeds, Plants and Sundry Supplies	311.85	
Fertilizers	152.49	
Feeding Stuffs	708.78	
Library	287.71	
Tools, Implements and Machinery	578.93	
Scientific Apparatus	26.71	
Live Stock	291.35	
	$15,000.00	$15,000.00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending, June 30, 1903, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000.00, and the corresponding disbursements are $15,000.00, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed) J. G. Lee,
Commissoner of Agriculture and Immigration.
Wm. Garig,
Vice President Board of Supervisors and Ex-Officio Member of Board of Agriculture.

SUPPLEMENTARY STATEMENT.

To receipts from other sources than the United States, for the year ensuing July 1, 1903:

1903.	Cr.	Dr.
To balance, July 1, 1902		$11,209.99
State Appropriation		15,000.00
Geological Survey		5,000.00
Fertilizer Fund		10,000.00
Farm Sales		1,869.30
Miscellaneous Receipts		8.63
		$43,087.92
By Salaries	$8,400.61	
Labor	3,326.93	
Freight and Express	213.79	
Heat Light and Water	240.25	
Chemical Supplies	90.09	
Seeds, Plants and Sundry Supplies	324.59	
Fertilizers	158.73	
Feeding Stuffs	737.92	
Tools, Implements and Machinery	602.57	
Furniture and Fixtures	85.00	
Traveling Expenses	143.90	
Contingent Expenses	2,425.93	
Buildings and Repairs	1,096.81	
Insurance	143.80	
Geological Survey	5,000.00	
Fertilizer Fund	10,000.00	
		32,990.92
By balance, July 1, 1903		$10,097.00

SEVENTEENTH

ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

A. & M. College.

FOR 1904.

TO THE GOVERNOR.

BATON ROUGE:
TIMES PRINT
1905.

SEVENTEENTH

ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

A. & M. College.

FOR 1904.

TO THE GOVERNOR.

BATON ROUGE:
TIMES PRINT
1905.

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE.

OFFICE OF STATE EXPERIMENT STATIONS.

BATON ROUGE, LA.,
January 29, 1905.

To His Excellency, Newton C. Blanchard, Governor of Louisiana.

SIR:—In accordance with the provisions of Section 2, of the Act of Congress, to establish Agricultural Experiment Stations in connection with colleges established in the several States under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations, for the year ending February 1, 1905, including a statement of the receipts and disbursements, from July 1, 1903, to July 1, 1904.

The resignation of Dr. W. C. Stubbs as Director took effect on January 1, 1905. Therefore the work of the past year was almost wholly under his administration, with headquarters at Audubon Park, New Orleans.

The office of the Director will be maintained hereafter at Baton Rouge, in the Experiment Station building at the University.

RETIREMENT OF DR. W. C. STUBBS.

On January 1, 1905, the resignation of Dr. W. C. Stubbs as Director of the Stations took effect. He came to Louisiana in 1885 to take charge of the Sugar Experiment Station, established by the Louisiana Sugar Planters' Association. When the other two Agricultural Experiment Stations were established under the Hatch bill, Dr. Stubbs was made Director of the three stations, the Sugar Station becoming one of them. He served continuously in this capacity up to the 1st of January, 1905. The State has been indeed fortunate to retain his services for so extended a period. It is the general verdict of well informed men, that he has done more than any other one man in the history of the State for the development of her resources. It is a great misfortune to have a man like him retire to private life while yet in the zenith of his usefulness. The good work he has done will be a perpetual benefit to the State. The numerous bulletins published, giving the results of his work and of those associated with him, are contributions of inestimable value to the science of agriculture.

He retires at a time when the State, as a whole, is in a prosperous condition. As long as agriculture is a leading industry in Louisiana, the chief exponents of the science will bear testimony to the great services he has rendered his adopted State.

GENERAL STATEMENT REGARDING CROP CONDITIONS.

SUGAR CANE.

The year 1904 has been very favorable for most farm crops. For sugar cane it has been unusually favorable throughout the cane growing belt. Because of a deficiency in the normal rainfall in early spring, work was almost uninterrupted from time of spring planting until the crop was laid by. Through the summer the rains were light, but well distributed, resulting in the production of the largest crop ever raised, and that on reduced acreage. Up to the middle of December the weather was generally favorable for harvesting. With the unusually heavy tonnage the sugar content was not up to the standard, but the price of sugar has been high, and the planters have had a prosperous season. While the year 1905 begins with unfavorable weather, and every one is behind with his work, owing to the grinding season lapping over far into January, planters feel encouraged, and will increase the crop as much as circumstances will permit this year.

The Station irrigated their cane crop once the past season, but this was of doubtful utility, as a rain fell soon after the field was irrigated.

This is in striking contrast to the results obtained the previous season. The total rainfall of the year 1904 was only about two-thirds the normal, yet it was one of the best crop years, except for corn in some sections, that we have had for some time.

RICE.

The rice crop was very good, and no serious losses occurred from severe storms or other disasters. The price, however, has not been satisfactory, and many rice planters have suffered because of a dull market. The situation in Southwest Louisiana fully demonstrates that some diversification, and more scientific methods should be adopted by the rice planters. The Station has advised this for years, but the advice has, during times of prosperity, fallen on deaf ears. There has been some disposition on the part of many planters to fertilize their fields, secure better drainage in winter, destroy red rice, select better seed, and produce a better grade of rice and more of it per acre, and have less acreage. We believe the solution to the difficulty lies along this line, and to this end the Station is exerting its influence. The investigations carried on in previous years, have enabled us to give valuable information on these subjects. The bulletin giving results of feeding by-products of the rice mills has been a very popular one, and of great value in increasing the market for these products.

COTTON.

The cotton crop of the State was very good. In the early part of the season the price was high. Those who sold their crop as fast as it was gathered made good profits during the early part of the season, and many of the small farmers of the northern portion of the State disposed of their entire crop to advantage. The latter part of the season the price went down to such an extent that it did not bring the cost of production. The crop of 1904 was a more expensive one to most farmers than has been produced for several years. The high price of the previous year encouraged extravagance, and many abandoned the plan of diversification, which was beginning to find favor, and put all available land in cotton. The Stations have persistently advised against this course. Since the price of cotton has been below eight cents, the correspondence of the Station has been unusually heavy regarding forage crops, cattle raising, and diversification.

Recent bulletins on these subjects have been almost exhausted and re-prints will have to be issued.

STATION NO. 1—SUGAR EXPERIMENT STATION, AUDUBON, PARK, NEW ORLEANS, LA.

The work of this Station during the year 1904 has been largely a continuation of work outlined in previous reports. The investigations carried on in field, sugar house, and laboratory, have given very satisfactory results.

SEEDLINGS, D-74 AND D-95.

Our experiments with the seedling canes have been continued and the reports of planters in answer to an inquiry sent out to them this year for the past season's results, have been extremely favorable. The cultivation of these canes is extending very rapidly and the planters this season will have a very marked increase in the area planted, the majority of the planters preferring to increase their area, owing to the superior merits of these canes, rather than make practical tests in their sugar houses. The D-74 is the favored one of the two varieties; the D-95, while meeting with marked favor in some localities, does not meet with the universal approval accorded the D-74. They claim that D-74 is a heavier tonnage producer than our home canes, and produces more sugar per ton of cane. Results at the Station show both of these seedlings to be superior to our home cane.

ORANGES.

Of the hybrid oranges, we have had a number of trees to bear this year. These oranges were introduced by Dr. Stubbs in 1899 through the courtesy of the Department of Agriculture at Washington. This year they bore their first fruit and eight of them have proven very promising, and all have withstood the cold we had this year (18 deg. F.) extremely well.

OLIVES.

While several of our more tender trees were seriously injured by this cold, though our other hardier varieties withstood it admirably, our olive trees, grown on the Station since 1899, have this year bloomed for the first time, and while failing to set any fruit, they are promising, and we have hopes of some results during the coming year.

CORN, FORAGE CROPS.

Experiments have been continued in testing different varieties of corn and forage crops. Alfalfa, red and crimson clover, sorghums, teosinte, giant beggar weed, and many others, have been tried and our results, particularly with alfalfa, crimson and red clover, have been very good again this year. Alfalfa yielded us seven cuttings during the past year, with a maximum of two and one-half tons cured hay per acre from one cutting.

In the sugar house we have carried on our experiments in sugar manufacture and control, comparing different methods of clarification, boiling and extraction, the results of which we will not be able to state positively until the completion of work on the raw products remaining in our hot rooms.

The work of the sugar laboratory has followed along the lines indicated in the previous report. Early last year, several weeks were given up to the collection and installation of material for a sugar laboratory exhibit at the St. Louis Exposition. This sugar laboratory was placed in a collective exhibit illustrating the work of the various Agricultural Experiment Stations of the country, and was awarded the grand prize.

Researches by Dr. C. A. Browne in the laboratory concerning the constituents of bagasse and its adaptability for paper making, have been completed and the results published. Further work along the line of bagasse utilization is to be carried on. Investigations for the Association of Official Agricultural Chemists have been conducted upon special methods of sugar analysis and this work is to be continued the present year. In the matter of feed stuffs, experiments have been carried out in co-operation with a large feed concern in Illinois upon the improvement of the rice feeds. The results have been so encouraging that a large factory has been erected at Crowley for the manufacture of different feeds. Special attention has also been given in the laboratory to the utilization of molasses in the manufacture of mixed feeds.

In the work of the sugar house the losses which cane products undergo through fermentation are being investigated. The deterioration of molasses in the hot room is of particular importance in this respect. During the last sugar season tests were made of different methods of clarification and the chemical part of this work is still under way.

COTTON.

Only a few cotton plants were grown at this Station. These were to serve as trap plants, to test the efficiency of the methods adopted the previous year for the destruction of the Mexican boll weevil. Not a single boll weevil appeared during the season, which demonstrated conclusively that they had been exterminated from our fields.

SUGAR SCHOOL.

During the past grinding season, students of the Audubon Sugar School of the Louisiana State University were given instruction in practical work in the field, laboratory and sugar house.

STATION NO. 2 - STATE EXPERIMENT STATION, BATON ROUGE, LA

Experiments on the uses of fertilizers have been continued, by way of verification of results previously secured.

The leading early varieties of cotton have received special attention during the past year, owing to the importance of earliness in securing a crop in the boll weevil infected territory. These experiments have been conducted on large plats of ground, and have shown that several varieties, especially Tool's and Shine's are about as early as King's, and that the variety that has been developed by the stations, called Griffin, is not more than a week or ten days later than either of these and has a much longer staple. It is possible that a few more years of careful selection will make this variety earlier, and yet retain a long staple. The work of hybridizing cottons was interrupted on account of duties in connection with the Exposition at St.

Louis consuming the time of the party in charge of this work. It will be taken up again this year, and modified to try to meet the new demands that have been brought about by the invasion of the boll weevil.

TOBACCO.

The work on cigar tobacco was discontinued the past year. The extended experiments of previous years have shown that we can grow some very high grade cigar tobacco, but the percentage of this quality is small. The fact that some of the crop is very fine, leads us to believe that a careful record of individual plants and their products might result in the discovery of a strain of the Cuban type in which the characteristics desired could be perpetuated by continued selection for a number of years. Until this work can be done, it would seem we could not recommend cigar tobacco growing as a commercial enterprise on the "bluff lands."

CATTLE TICKS.

The work of Prof. Morgan and other members of the station staff on the cattle tick has resulted in a demonstration of a practicable and easy method of eradicating this pest from the pasture lands of the State. In view of the increasing interest in the growing of live stock throughout the South, this discovery is of inestimable value. A bulletin will be issued in the near future giving the results of this work.

Prof. Morgan has devoted the greater portion of his time during the past year to the duties assigned him by the Crop Pest Commission. His splendid work along this line is well known throughout the State.

The Veterinary Department, under Dr. W. H. Dalrymple, has rendered valuable service to the State in aiding in efforts to stamp out contagious and infectious diseases, in advising planters and farmers regarding questions of feeding, sanitation, etc. The results of his work on the nodule disease of sheep has been published as Bulletin No. 79.

The Horticultural Department has continued most of the lines of work according to plans formulated for extending experiments over several years. The bulletin on pecans has been a very popular bulletin, and our supply is nearly exhausted. It will soon be necessary to issue a re-print if we continue to meet the demands for it from outside the borders of our State.

Some experiments testing the influence of canvas cloth shade on some of our standard truck crops has been inaugurated.

CATTLE.

The raising and feeding of beef cattle is one of the important subjects receiving attention, with gratifying results. The sale of a carload of "market toppers" on the Chicago market, a few days previous to the writing of the last annual report, has been followed by very gratifyng results in advertising the possibility of beef production in Louisiana. The agricultural and live stock papers all over the United States have copied the reports of the Chicago papers, or commented upon them.

Plans have been formulated for continuing this work with cattle raised south of the quarantine line.

We have on hand now, twenty-five head of Hereford and Angus grade calves and yearlings that we have raised on the station, and some of these are exceptionally good animals.

STATION NO. 3—NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA.

This station has had a very good season. Field experiments with corn, cotton, forage crops, small grains and tobacco have been continued.

The station has the following breeds of cattle: Jerseys, Guernseys, Devons and Red Polls. The increase, especially in the male line, is supplied to the farmers of North Louisiana at reduced prices. It has on hand now young bulls of the following breeds; Jersey, Devon and Red Poll.

The following breeds of hogs are grown: Berkshire, Poland China, Essex and Red Jersey. The pigs from these breeds are sold to the farmers of the State at low figures.

Of the following breeds of sheep experimented with, viz., Dorset, Shropshire, Southdown and Merino, the last appears to succeed the best.

By a frequent change of pastures or giving an extensive range of grazing, the losses due to stomach worms and nodule diseases can be greatly reduced.

The orchard gave a good crop of fruit the past season, and an orchard of peaches has been put out for an experiment on a commercial scale.

The Station has given special attention to truck growing, and in co-operation with the farmers of the vicinity, have made several carload shipments to the markets, with satisfactory sales. This has greatly stimulated the interest in truck growing throughout North Louisiana, and a very considrable increase in acreage will be devoted to these crops the coming year.

The results of the year's work in truck and fruit, and results of experiments in canning the surplus products, are now being published in bulletin form for general distribution.

ANALYSES OF FERTILIZERS AND PARIS GREEN.

Fertilizers:

The following number of analyses have been made during the season just ended in the laboratories of the Stations:

Complete fertilizers	2,409
Tankages	317
Bone meals	239
Acid phosphates	408
Cotton seed meals	824
Acid phosphates, with potash	60
Miscellaneous	76
Private samples, etc.	47
Total analyses	4,380

This is an increase over the work done the previous year. Under the fertilizer law every citizen in the State is amply protected from fraud and imposition by unscrupulous dealers, and there exists absolutely no cause for distrust in the purchase of commercial fertilizers, if the farmer will but claim the protection offered him. The sellers of good wares are also protected, as ample facilities are afforded them of properly advertising their goods.

The accuracy of the work of the analytical department has been such as to gain the absolute confidence of dealers and purchasers, and with certain classes of fertilizers the buyer and seller frequently make a contract to settle the price of the fertilizer on our analyses.

ANALYSES OF FEED STUFFS.

The beneficial effects of the law controlling the sale of feed stuffs has already been very noticeable in checking the sale of impure foods. The analyses of samples, required by this law, have greatly added to the demands made upon the chemical department. The work has started off auspiciously, and there is every reason to believe the people will soon appreciate this work as they already appreciate the control of fertilizers.

PARIS GREEN.

A total of 378 samples of Paris green were analyzed, all of which came up to the guarantee. Paris green is largely used in this State as an insecticide, chiefly for the destruction of the cotton caterpillar, whose ravages are frequently so injurious. This chemical consists chiefly of the "arsenite of copper," with a small proportion of the acetate of copper, and a first-class article should contain not less than 50 per cent of arsenious acid, known in its pure state as white arsenic.

This article is frequently adulterated, and there are abundant opportunities for fraud in its purchase.

Many farmers and planters in Central Louisiana have made reports of the ineffectiveness of the Paris green used on their cotton during the present season. This is reported after a failure, but they failed to take samples in accordance with the law, and therefore had no means of ascertaining positively whether fraud had been perpetrated.

The law fully protects every farmer if he will observe it. Before buying, inspect packages and see that "Strictly Pure" and "Guaranteed," with the fac-simile of the signature of the Commissioner of Agriculture and Immigration are stamped on each. If they are, take a sample in accordance with directions of the law, and if after using, little or no benefits accrue, have it analyzed by the official chemist, and if deficient, damages can be recovered.

The following constitute the present staff of the Stations:

NO. 1—SUGAR EXPERIMENT STATION.

Postoffice, Audubon Park, New Orleans, La.

R. E. Blouin, M. S., Assistant Director, and Chemist.
P. L. Hutchinson, B. S., Chemist.
C. A. Browne, Jr., Ph. D., Chemist.
Geo. H. Hardin, B. S., Assistant Chemist.
Jas. E. Haligan, B. S., Assistant Chemist.
G. D. Harris, M. S., Geologist.
J. A. Pacheco, Assistant Geologist.
J. A. Hall, Jr., B. S., Assistant Chemist.
H. P. Agee, B. S., Assistant Chemist.
J. A. Verret, B. S., Assistant Chemist.
E. B. Ricketts, B. S., Assistant Chemist.
Geo. Chiquelin, B. S., Chemist and Sugarmaker.
Clifford Waldron, Farm Manager.
R. Glenk, Ph. G., B. S., Chemist.
J. K. McHugh, Secretary and Stenographer.
W. T. Gobins, Chemist.

NO. 2—STATE EXPERIMENT STATION.

Postoffice, Baton Rouge, La.

W. R. Dodson, A. B., S. B., Director.
S. E. McClendon, B. S., Assistant Director.
C. E. Coates, Ph. D., Chemist.
Wilmon Newell, M. S., Entomologist.
F. H. Burnette, Horticulturist.
W. H. Dalrymple, M. R. C. V. S., Veterinarian.
L. O. Reid, Farm Manager.
H. Skolfield, Treasurer.

NO. 3—NORTH LOUISIANA EXPERIMENT STATION.

Postoffice, Calhoun, La.

D. N. Barrow, B. S., Assistant Director.
Ivy Watson, Farm Manager.
E. J. Watson, Horticulturist.
————, Tobacconist.
Geo. H. Malone, Dairyman.

At the end of this report will be found a correct exhibit of the receipts and expenditures arising from the Hatch bill for the fiscal year ending June 30, 1904. It shows that expenditures have equaled receipts.

There is also given a supplementary statement of receipts from all sources and expenditures of every kind.

All of which is respectfully submitted.

W. R. Dodson,
Director.

STAFF OF THE STATIONS.

Since the last report several changes have taken place in the personnel of the Stations. Prof. H. A. Morgan, resigned the first of February to accept the position of Director of the Experiment Station of Tennessee. Mr. Wilmon Newell, State Entomologist of Georgia, was selected to fill the vacancy. Mr. Newell entered upon his duties the 15th of February. Mr. S. E. McClendon, a graduate of the Louisiana State University in the Agricultural Course, was elected Assistant Director at the Baton Rouge Station, and entered upon the discharge of his duties on February 1st. Mr. B. H. Atkinson, Farm Manager at Baton Rouge, resigned in December, and Mr. L. O. Reid was elected to fill this position. Mr. Clifford Waldron is now Farm Manager at Audubon Park, in place of Mr. Williams, resigned. Three additional chemists have been employed at Audubon Park. They are E. B. Ricketts, J. A. Hall, W. T. Lobins.

As noted elsewhere, the present Director assumed his duties the first of January, 1905, and the office of the Director was moved to Baton Rouge. Mr. R. E. Blouin, Assistant Director at Audubon Park, continues in that position and has active charge of the Station there.

DESTRUCTIVE FIRE AT CALHOUN STATION.

We were again visited by a destructive fire at Calhoun. The tobacco barn was burned late in the summer. A few weeks later the residence and laboratory were burned. A shipment of household goods and furniture from Monroe to the Station a few days later was destroyed by fire with the depot of the Vicksburg, Shreveport & Pacific Railroad.

Plans are being considered for the rebuilding of the Station residence and laboratory. All buildings were covered by insurance, which has been promptly paid. The insurance represents about two-thirds the loss.

The Station records were burned with the residence, and much valuable data has been lost. Only a part of this can be compiled from reports.

GEOLOGICAL SURVEY.

Prof. G. D. Harris and Mr. A. J. Pacheco are in the field and will devote the remainder of the present winter to studying the salt deposits and in establishing a bench mark and determining the mean tide level of the Gulf of Mexico at Weeks Island. The United States Geological Survey has agreed to pay one-half the cost of determining the tide level. This matter is of considerable importance, and requires very careful work for an extended period of time.

A complete report on the salt beds of Southwest Louisiana will be issued by Dr. Harris during the coming summer.

His reports on the oil fields and the subterranean waters of the State is now being printed and will be ready for distribution in a few weeks.

SOIL SURVEY.

The Bureau of Soils of the Department of Agriculture at Washington has reassigned a corps of men to work in Louisiana. Since the last report of the Director, Tangipahoa Parish has been completed, and East Baton Rouge Parish is being surveyed. Ouachita Parish will be completed in the near future, and this work will then be taken up in Northwest Louisiana.

This work is done entirely at the expense of the United States Department of Agriculture, and the results furnished to the State Geological Survey.

UNITED STATES GEOLOGICAL SURVEY.

The co-operative work between the Louisiana Geological Survey and the United States Geological Survey, in making a topographical survey of portions of Louisiana has been continued. Effort has been made to have this work done without cost to the State of Louisiana. As previously reported, an agreement was made between the Director of the Stations, who has charge of the Geological Survey, and Mr. Chas. D. Walcott, Director of the United States Geological Survey, in accordance with which Louisiana contributed $2,500.00 toward the expense of the survey of each quadrant surveyed. Two quadrants have been surveyed under this agreement. It is hoped the work will be continued till the whole State is accurately surveyed. This work will be of great value in construction of roads, railroads, drains, and will be of inestimable value in mapping the State. In the section of the country where we seek immigration the idea is quite prevalent that Louisiana is one vast flat, mainly composed of swamp land and inhabited by mosquitoes, alligators and snakes. A topographical map of the State would be of greater value than other printed literature in dispelling this erroneous impression.

FARMERS' INSTITUTES.

The members of the Station Staff continue taking an active part in the farmers' institutes. All of the institute conductors, except for special institutes, were station men.

FINANCIAL STATEMENT.

1904—	Cr.	Dr.
Receipts from the Treasurer of the United States for the year ending July 1, 1904		$15,000 00
By Salaries	$ 8,686 32	
Labor	2,742 86	
Publications	1,262 19	
Postage and Stationery	364 67	
Freight and Express	104 99	
Heat, Light and Water	320 76	
Chemical Supplies	36 05	
Seeds, Plants and Sundry Supplies	318 15	
Fertilizers	127 47	
Feeding Stuffs	566 78	
Library	152 31	
Tools, Implements and Machinery	269 40	
Scientific Apparatus	14 39	
Live Stock	33 66	
	$15,000 00	$15,000 00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College, for the fiscal year ending June 30, 1904, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000.00, and the corresponding disbursements are $15,000.00, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed) J. G. Lee,
Commissioner of Agriculture and Immigration.
H. L. Fuqua,
Vice President Board of Supervisors and Ex-Officio Member of Board of Agriculture.

SUPPLEMENTARY STATEMENT.

To receipts from other sources than the United States, for the year ending July 1, 1904:

To balance, July 1, 1903		$10,097 00
State Appropriation		15,000 00
Geological Survey		5,000 00
Fertilizer Fund		11,558 72
Farm Sales		2,574 93
		$44,230 65
By Salaries	$7,831 39	
Labor	3,219 88	
Freight and Express	123 27	
Heat, Light and Water	376 55	
Chemical Supplies	42 33	
Seeds, Plants and Sundry Supplies	373 49	
Fertilizers	149 65	
Feeding Stuffs	665 34	
Tools, Implements and Machinery	316 26	
Furniture and Fixtures	4 25	
Scientific Apparatus	16 91	
Live Stock	41 69	
Traveling Expenses	269 90	
Contingent Expenses	3,133 02	
Buildings and Repairs	479 53	
Insurance	434 10	
Geological Survey	5,000 00	
Fertilizer Fund	11,558 72	—34,036 28
By balance July 1, 1904		$10,194 37

W. R. Dodson,
Director.

EIGHTEENTH

ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

A. & M. College

FOR 1905.

TO THE GOVERNOR.

BATON ROUGE:
THE TIMES, OFFICIAL JOURNAL OF LOUISIANA.
1906.

EIGHTEENTH

ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

A. & M. College

FOR 1905.

TO THE GOVERNOR.

BATON ROUGE:
THE TIMES, OFFICIAL JOURNAL OF LOUISIANA.
1906.

LOUISIANA STATE UNIVERSITY

AND

Agricultural and Mechanical College.

OFFICE OF STATE EXPERIMENT STATIONS.

BATON ROUGE, LA., February 1, 1906.

To His Excellency, Newton C. Blanchard, Governor of Louisiana:

SIR—In accordance with the provisions of section 2 of the Act of Congress to establish Agricultural Experiment Stations in connection with colleges established in the several States under the provisions of an Act approved July 2, 1862, and the Acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations for the year ending February 1, 1906, including a statement of the receipts and disbursements from July 1, 1904, to July 1, 1905.

STATION No. 1.

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS.

Under the immediate direction of Mr. R. E. Blouin, this station has continued investigations along lines given in previous reports, and has taken up some new problems. The work conducted in the field, sugar house and laboratory have given much valuable information of technical and practical value. Comparing the records of weather conditions that have generally prevailed over the sugar section with those at the station, we find that our results have been obtained under average climatic conditions, but our tonnage of sugar cane was the heaviest secured for several years, with a fairly good sugar content.

This heavy crop, at a time when a large portion of the State experienced a disappointment in tonnage, is explained by the fact that our soil was well prepared and the crop planted in the fall in excellent condition.

Planters who were forced to prolong the grinding season of the previous crop well into January began the cultivating season of 1905 under adverse conditions. The excessive rains made it impossible for them to complete the planting until late in the spring. The crop started growing with deficient cultivation, and spring was well advanced before the fields were put in good tilth. An unusually good stand of cane was secured over nearly the entire cane belt, and the greater portion of the summer gave favorable growing weather, but this was not sufficient to eliminate the effect of an adverse spring and insufficient cultivation, thus emphasizing the disadvantage to the man who can not do a large part of his planting at a favorable season in the fall.

The station plats for comparative tests of irrigated and non-irrigated cane, did not give any positive results. Only once was it deemed advisable to irrigate, and at this time a good rain fell soon after the work was completed. The irrigated and non-irrigated plats gave practically the same yield. The fact that the irrigation did no harm is of some importance. The fear that heavy rains, coming close after a period of artificial irrigation, might cause damage to the crop from excessive moisture has been a matter for serious consideration in discussing the practicability of irrigating the cane fields of Louisiana.

The investigations with sugar canes in the field embrace, besides the former experiments with home canes, varieties and seedlings; a study of the fertilizer requirements of D. 74, which has been found so well adapted to our conditions in Louisiana; also experiments with combinations of various sources of nitrogen in mixed fertilizers, to determine the early availability of nitrogen from these mixtures for the cane crop.

In the cultivation experiments two new combinations of cultivation with new implements were added. Experiments on planting cane at different periods have been started, and a careful study of the value of seed cane under different conditions is in progress. A study of the effects of the disc and the turn-plows in the preparation of the land, and the effects of the successive planting of cane on the same soil (or succession cane) have also been added as new experiments.

D. 74 and D. 95 seedling canes have maintained their high standard reported in previous years, and favorable results have been secured from the sugar plantations and at the station. The area of these seedlings is being very rapidly extended, and during the past season quite a number of tests were made in the sugar houses in the State, comparing these canes with our home varieties. In continuation of the policy adopted three years ago, of obtaining reports on the results of these seedlings on plantations, we received the past year, almost without exception, favorable reports from both field and sugar house.

This season the D. 74 has tasseled or arrowed in several places in this State, as well as in Florida, which State secured its supply of this cane from this station, thus showing that it maintains with us its early maturity, which is so pronounced in the tropics. Several tassels that have matured have been secured and planted by the station with the hope of producing seedlings originating in Louisiana.

NEW SEEDLING VARIETIES.

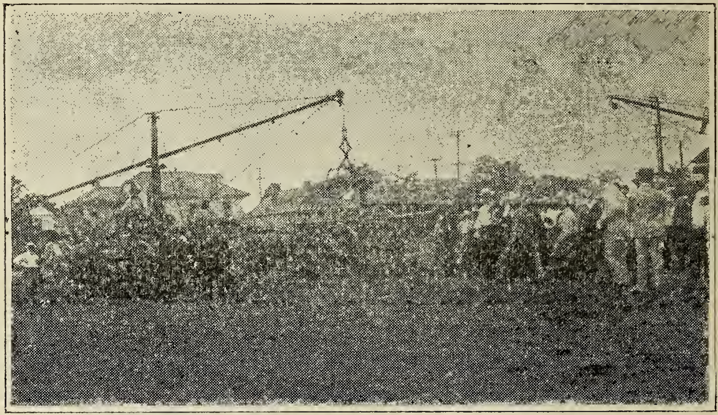
We have introduced from Demerara, Barbadoes, Trinidad and Jamaica fifty-four new seedling varieties during the year, and quite a number of these show very promising characteristics. Additional new varieties are to be introduced this year.

In the sugar house comparative tests or runs were made with home canes D. 74 and D. 95, and the results, as on previous occasions, show markedly the superiority of the D. 74 over the other two varieties, followed by the D. 95 and the home canes in the order given. A study of sugar boiling has been continued, and the results will form a portion of a bulletin to be issued the present year.

Dr. C. A. Browne, Jr., and his assistants in the laboratories have completed investigations on the changes in composition of cane products in the progress of manufacture under different conditions of clarification, etc., and these results, together with a study of the chemical composition of the cane, are being prepared for publication in bulletin form. A study of the effects of different fertilizing ingredients on the composition of the cane and other investigations relative to the chemistry of sugar cane are now in progress.

CANE LOADERS.

The year 1905 marks the general adoption of machinery and horse power for loading cane from the row to the carts and wagons, ready to be conveyed to the mill. On two occasions the station invited manufacturers to send their cane loaders to give a public demonstration of the working efficiency of their machines. These tests were extensively advertised, and proved a strong drawing card. The following parties had cane loaders ready for trial on the appointed day: Bodley Wagon Company, Val. Goetz, Jr., J. C. Mire and P. A. & L. Trouard, with full-size implements, and J. D. Martinez and M. A. Picard, exhibiting models of their cane loaders.



TESTING CANE LOADING MACHINES AT STATION No. 1, SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS, LA., 1905.

These trials were a magnificent success. The first trial in which all the inventors mentioned took part was attended by more than 250 sugar planters and parties directly interested in the success of a cane loading device. Some of our best-informed planters stated that this was the largest number of representative cane sugar men ever assembled in Louisiana at any one time.

These gentlemen were from every sugar cane district, and, it may be added, from every sugar parish in the State, and were accorded a good opportunity to determine the relative merits of the different machines. The second trial was on July 20, in which the Goetz and Trouard implements were practically tested and the Martinez and Picard models exhibited. This test was very successful and well attended, though the attendance was not as large as at the first test, there being about one hundred people present.

TESTING CANE LOADING MACHINES AT STATION NO. 1, SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS, LA., 1905.

CANE HARVESTERS.

Several tests of cane harvesters were made at the station, but as yet this machine has not attained sufficient development to be put into practical use.

There were this year five working machines in the State and six prospective ones, for which patents have been secured. There is a marked improvement in the work of the various machines tested, and the outlook is very hopeful for a successful device to cut, strip, top and load the cane in the field. This, when accomplished, will relieve the labor situation at grinding time very greatly, and, it is hoped, will considerably diminish the cost of harvesting.

In considering this question, again we find some desirable features in the D. 74 cane. One of the chief difficulties in the way of perfecting a cane harvesting machine is to gather the fallen and crooked stalks. The D. 74 stands erect and withstands the storms far better than our Louisiana canes, and to this extent would be less difficult to harvest by machinery.

GENERAL AGRICULTURAL IMPLEMENTS.

The station has also tried quite a number of new agricultural implements proposed for work on our alluvial soils, and suggested changes which were possible and discussed the merits of the implements. Plows, cultivators, distributors of barnyard manure and filter-press cake and planters are the character of implements tested for the first time on alluvial soils at the sugar experiment station. We invite all manufacturers, agents and inventors of new implements to test them here, and while no publicity is given to these tests, any visitor to the station is always welcome to witness them.

SUGAR SCHOOL.

As has been the policy of the station for a number of years, the students of the Audubon Sugar School of the Louisiana State University and Agricultural and Mechanical College at Baton Rouge, La., were given a three months' course of practical work and instruction in agriculture, chemistry and sugar house work with sugar cane. The demands for graduates of this school exceed the supply so much that frequently students are induced to enter commercial work before finishing their regular course. The past season's requests for graduates and students were much heavier than usual, and only a small number could be supplied.

COTTON.

This crop, of which only a few trap plants were planted last year, was continued in the usual quantity this year, testing the varieties, and a very good yield was obtained, notwithstanding the unfavorable conditions that prevailed. The maximum yield of a little over two bales per acre was secured, this variety giving a yield of 3162 pounds of seed cotton. As reported last year, no boll weevils were found during the season, and the crop was planted on the same land that had cotton in 1903, when the boll weevil was placed in the station cotton by some miscreant, showing conclusively the extermination of the boll weevil here.

CORN.

Different varieties were tested, and home-grown and purchased seed of the same varieties compared; the home-grown seed giving the larger yield.

FORAGE CROPS.

Experiments have been continued with a large number of varieties of these crops, embracing alfalfa, red and crimson clovers, sorghums, teosinte, giant beggar-weed, cow peas, vetches, etc. Alfalfa yielded us five cuttings during the year from spring planting, yielding 3140 pounds of cured hay from the maximum cutting. With red and crimson clovers the results were very good. The other crops gave very good yields, but are not as profitable as either alfalfa or clovers.

The growth of the New Era cow pea attracted considerable attention from the sugar planters, and this year quite a number of them are planting this pea in their old stubble cane, which they expect to use for succession cane. This pea is a vigorous grower and comparatively a bunch pea, one that answers the desired qualities for planting in stubble cane, the vining varieties so popular for planting with corn causing much trouble in harvesting the cane.

FIBER CROPS.

The station continues its experiments with these crops, growing ramie and several varieties of jute and hemp. Inventors of decorticating machines frequently require us to furnish them with quantities of these crops for trial runs, and the quality of fiber secured from Louisiana-grown plants has been pronounced very fine. Japanese hemp, recently introduced here by the station, is a very prolific and vigorous grower, producing a superior fiber and giving large yields. All of these crops, however, await the perfection of a practical decorticating machine.

OLIVES.

All of our olive trees were healthy and vigorous growers this year; they bloomed in 1904 for the first time, but failed to set fruit. This year 50 per cent of the trees were in bloom and one variety, the *Pendulina*, set fruit which came to maturity. They were successfully pickled and are of fine flavor and medium size. It is believed that these are the first olives grown to maturity and pickled in Louisiana.

CITROUS FRUITS.

The growing of citrous fruits has long been an established industry in the southern section of Louisiana, though several times freezes have almost exterminated the orchards. The station being located in the northern portion of the citrous belt, our entire orchard was destroyed by the freeze of February, 1899. The orchard was replanted and a number of new varieties added to those previously grown, and these are now coming into bearing.

Hybrids, originated by Mr. H. J. Webber, of the Bureau of Plant Industry, United States Department of Agriculture, by artificially crossing the *Citrus trifoliata* with the edible oranges, and supplied to the station by Mr. Webber, have shown a larger number of bearing trees this year, and some of them are very promising in the quality of fruit, and we hope they will be resistant to our most severe freezes. They were not affected by a temperature of 18 degrees F. above zero, the coldest weather we have had since they were planted.

The *Citrus trifoliata* is very hardy, the coldest weather of North Louisiana having no harmful effect upon it. The fruit, however, is worthless. The idea of cross-breeding is to impart increased resistance to freeze to a plant that will produce a fruit that can be utilized.

During the past year we received from Mr. Webber stock for all of the stations from his new fruit, "citrange," which he believes will be hardy in a large portion of the State, and produce a desirable fruit, and also serve as a basis for further improvement. A number of trees have also been distributed in the State at the request of the director of the stations.

The following changes in the station staff were effected this year: In March Mr. W. F. Gobius resigned to accept a position as chemist at the Kahuka Sugar Company, in the Hawaiian Islands, and in January (this year) Mr. J. A. Verret, who was our chemist and sugar maker, handed in his resignation to accept a position as chemist of the Honolula Sugar Company, also in the Hawaiian Islands. Both of these gentlemen left the station owing to inducements offered them to enter the practical manufacture of sugar. Mr. Verret's position has been filled by Mr. Hamilton P. Agee, a graduate of the Sugar School, who has been assistant chemist on the station since his graduation.

STATION No. 2.

STATE EXPERIMENT STATION, BATON ROUGE.

Mr. S. E. McClendon has conducted the experiments at the farm during the past year in a very satisfactory manner. Many experiments, begun years ago, and regarding which progress has been reported from year to year, have been continued. These experiments have embraced comparative tests of fertilizers on corn, cotton and other crops, as well as variety tests. The results of several years' work are being tabulated for publication.

SORGHUMS.

About 100 varieties of sorghums were planted, in co-operation with the Division of Seed and Plant Introduction of the United States Department of Agriculture. These were gathered from nearly every country in the world. These varieties were studied botanically at the same time their adaptability to this soil and climate was under consideration. The information gained will be of considerable practical value in the study of forage crops for Louisiana.

ROTATION EXPERIMENTS.

In our rotation experiments with cotton, followed the next year by corn and cow peas, which, in turn, are followed by oats and cow peas, and then again by cotton, results have been in keeping with previous records. This system gives five crops in three years. Duplicates of these experiments are carried on at Calhoun. It now seems that some method of rotation similar to the above, with the addition of minor crops, will prove the most effective to combine with the cultural method of raising cotton in the boll weevil infested territory.

SOJA BEANS.

We have been trying to find a variety of soja beans well suited to Louisiana soil and climate. Where this plant can be raised successfully, as it can be in some of the Southern States, it has qualities that render it often more desirable than the cow pea. We secured through the National Department of Agriculture varieties of soja beans from all foreign countries where this plant is grown. While our hopes have not been realized, some of these varieties, we believe, will afford a good working basis to breed from to secure what is desired.

ALFALFA.

This plant does not seed well in Louisiana, and it is much more profitable to use it for hay only than to try to produce our seed supply. Sufficient interest is now being taken in this crop to render it very desirable to learn our best source of seed. We have taken up this problem during the past year. Here again we are working in co-operation with the National Department of Agriculture, having secured through their kindness seeds from the different parts of the United States and from a number of foreign countries. These seeds were planted last October, and interesting and valuable results are promised by the present condition of the crop.

Experiments to determine the fertilizer requirements of alfalfa are also being carried on. These experiments are duplicated at Audubon Park, New Orleans.

OATS.

Another new line of work taken up is that of determining the fertilizer requirements of our oat crop. Interest in this crop is rapidly increasing throughout the greater portion of the State.

COTTON.

Our cotton experiments embrace tests of varieties as to earliness, productiveness, resistance to disease, per cent of lint secured at the gin, etc. These experiments are a continuation of work begun quite a number of years ago. The same can be said of the experiments with fertilizers for cotton. Results of sixteen years will be tabulated and publication made therefrom during the present year. Practically the same experiments have been carried on at all three stations, with two years' interruption at Audubon Park.

We have made observations regarding the number of bolls set at different periods during the early summer by different varieties of cotton, together with a study of the characters of stalk that give a maximum amount of early bolls. Where the boll weevil is present, it is more important to secure the early "setting" of bolls than it is to have early maturity of a portion of the crop. Consideration of the boll weevil has made it necessary to greatly modify our ideas as to what qualities are to be sought in the cotton stalk. Formerly, for our rich lands, we desired a stalk with a central stem with small side branches, because of the tendency of large branches near the ground to split off under the load of fruit and foliage. Now we desire the very characteristic we previously sought to get rid of. A stalk that produces vigorous branches near the ground, with short nodes, will produce more bolls at an early period than will a stalk of central axis, because there are more branches producing bolls. Since the weevil will destroy the top crop, splitting of stalks from the load of fruit is no longer a consideration. Again, it becomes desirable to use more quickly available fertilizer, that will hasten the early growth, and be exhausted by the time the top crop would come on. Of course, these conditions raise new problems that should be carefully worked out. It is hoped that we may, another year, secure the services of a man to devote his whole time to a study of the cotton plant.

RUST-PROOF COTTON.

Various diseases, all commonly designated as "rust" maladies that defoliate the plant, are nearly always more or less destructive in the greater portion of the State. Three years ago the writer began selecting plants that retained their foliage to the greatest degree in the midst of defoliated plants. Two years' results have clearly demonstrated that resistance in the plant to these diseases can be materially increased by selection, and the yield of lint very materially increased thereby.

Every effort that we have made along the line of selection has shown the cotton to be a responsive plant, and it is greatly to be deplored that more intelligent attention is not given to the selection of seed of this staple crop.

SOILING EXPERIMENTS.

Experiments in feeding green sorghum to beef cattle were conducted with satisfactory results until the appearance of disease among the cattle, which is noted further on, interrupted the work. Eight steers were fed for a period of two months. The details of this work will be published when results are verified by further investigation.

This work will be continued the coming summer. Silos will also be erected and a study of silage begun. In view of the increasing interest in live stock growing in the State, a number of interesting problems along the lines indicated above are being presented by the inquiries of the farmers.

BOLL WEEVIL.

The Mexican cotton boll weevil has invaded eleven parishes of the State. This year the baneful effects of this insect will be very pronounced in all of the Red River section above Alexandria, and in all territory west of that region. This includes much of the best cotton land in the State. The stations are taking an active part in the efforts to induce the people to adopt the most approved methods of cultivation, fertilization and crop rotation for the production of maximum crops in the infested territory.

Mr. Wilmon Newell, Entomologist of the station, gives all of his time to work on the boll weevil and other pests, under the direction of the Crop Pest Commission. As noted elsewhere, the station is doing work in the way of experimenting in forcing cotton to early fruiting, as well as along other lines, the results of which have a direct bearing on the boll weevil problem.

CATTLE TICK AND TEXAS FEVER.

As previously reported, this station evolved a system of eradicating the cattle tick that was thoroughly practicable. Further demonstrations have been carried on along these lines, with excellent results.

In November, 1905, the directors of the stations of Louisiana and Tennessee called a conference on the tick problem, with a view or organizing a concerted effort to begin a work of tick extermination throughout the South. Resolutions were passed asking Congress to make a special appropriation for beginning this work. A committee was appointed to conduct a campaign of education on this special topic, and to endeavor to bring the matter before the National Congress. It is gratifying to know that a special appropriation has been asked for this work, and Louisiana's Congressmen are taking an active interest in securing favorable consideration of the bill carrying the appropriation.

RICE EXPERIMENTS.

We have made preliminary arrangements for conducting experiments, in co-operation with the National Department of Agriculture, in testing a large number of varieties of rice, studying the rice plant from a botanical viewpoint, and for the determination of the influence of fertilizers on the productiveness of grain, milling qualities, etc. This work was begun last year in Texas, but the conditions under which it was conducted were not conducive to the best results, and the Department has expressed a willingness to move this work to Louisiana. Under the agreement of co-operation one of our senior students will be placed in charge of the work and his salary met by the National Department. This station will secure land and water facilities. The results of these experiments will be published conjointly or separately by the two co-operating parties, as may seem most desirable.

As soon as the busiest season for analysis of fertilizers and feedstuffs is over, we have planned to begin experiments determining the digestibility of rice as a food for man.

HORTICULTURAL DEPARTMENT.

The work of the Horticultural Department has been along general gardening lines during the year, under the direction of Prof. F. H. Burnette. Special emphasis has been given to the growing of sweet potatoes and onions under fertilizer tests, tomatoes, winter cauliflower, winter cabbage, experiments in growing vegetables under canvas and pecan propagation. Reports of these investigations will appear in due time. A number of new varieties of the different fruits have been added to the orchard, among them the citranges from the United States Department of Agriculture.

The interest in commercial growing of pecans continues to increase. Our supply of bulletins on this subject has been almost exhausted, so great has been the demand. The literature on pecan propagation and cultivation is so meagre that Louisiana is called upon to supply a number of other States. The Horticulturist of this station, with Mr. Robert Glenk, installed the Louisiana exhibit at Portland, Ore., and had charge of the exhibit for some weeks. The exhibit was said to have been a very creditable one, and to have attracted much favorable comment.

The Horticulturist has edited the proceedings of the Louisiana State Horticultural Society.

VETERINARY DEPARTMENT.

The principal experiment work engaged in during the year by the Veterinary Department has been in connection with the intestinal parasites affecting sheep, chiefly those producing the condition known as ''nodule disease of the intestines.'' A series of experiments have been conducted along this line during the past several years, and results published in bulletin form. The experiment of the past year, however, was to endeavor to raise lambs free from nodule disease of the intestines without having to separate them from their diseased mothers.

Results of this experiment were published in Station Bulletine No. 83, and aroused a great deal of interest among sheep men all over the United States, as well as eliciting favorable comment from agricultural journals abroad. It is hoped to further continue this line of experiment.

Bulletin No. 84, entitled "Texas Fever: A Summary of Our Knowledge of the Subject to Date," was also prepared by the Department during the year. Information regarding Texas fever had been so much sought after that previous literature regarding it became completely exhausted. The object of the last bulletin was to give, in summarized form, the facts previously published, in order to supply the demand which was constantly being made upon the station for such information. Requests for this bulletin have come from all parts of this country, as well as from foreign countries in which Texas fever, or the same disease, only known by some other name, exists. Several hundred copies were sent to Tennessee Experiment Station, at the request of the Director, for distribution in the tick-infested sections of that State, and a number were asked for by some of the veterinary colleges to supply the students with information regarding this particular disease.

The Department has been closely identified with the problems connected with economic stock-feeding throughout the State, more particularly in the sugar belt, and in connection with the work mules. This has been along the lines of balanced rations made up of home products, and the systematic feeding of them to stock. The economy of such system, both as to feeds and feeding, has, on a great number of our sugar estates, resulted in a saving of from 10 to over 50 per cent.

The importance of this subject has been brought to the attention of stock owners by lectures and papers presented at various association meetings, by personal interviews, and by a large amount of correspondence. The increased interest in this economy has been so manifest of late that the Department has at present in course of preparation a special bulletin on feeding, which it hopes to have ready for publication in the very near future, in order to supply our stock-feeders with intelligent information regarding this important problem.

Importers of pure-bred cattle from above the Texas fever line continue to take advantage of the offer previously made by the station, to artificially immunize such animals free of cost except for feed and attention, and which, we believe, has been the means of persuading many to purchase and import pure-bred animals, who, otherwise, would not have done so.

During the summer, it was observed that a number of young cattle on the station farm were suffering from internal parasitism. The parasites, or worms, were found to infest the lungs, stomach and bowels of the cattle, and a number of the animals became so badly infested that they succumbed. The varieties of worms found on post-mortem were: The *Strongylus micrurus*, or lung worm; the *Strongylus contortus*, or stomach worm, which also infests sheep; the *Uncinaria radiata*, a hook-worm in the intestines. The cattle in question were purchased outside of the State, and it is possible that they may have been infested with these worms when they came on the station, as no previous indication of such a condition had been observed on the farm. However, we have received the same species of worms from animals that died thirty miles north of Baton Rouge, and Prof Guilbeau reports having collected the species at one of the slaughter houses of Baton Rouge, some two or three years ago. No animals have been lost from this disease on the ranch from which these cattle were purchased.

The older animals did not suffer to any extent, the younger ones being mostly affected, which is generally the case with parasitic diseases. The disease is now apparently under control, and we do not expect to lose any more animals.

The Department's correspondence increases from year to year, and there is hardly a disease affecting live stock in the State that information regarding it has not been sought after. Inquiries relative to the various breeds of live stock best adapted to Louisiana conditions have also been quite numerous, showing a decided tendency on the part of our people to improve the quality of their animals.

The Veterinary Department, although not taking part in Farmers' Institute work in the field the past year, superintended the entire clerical work in connection with the different corps and itineraries for the State Board of Agriculture and Immigration.

At the present time this Department is assisting the Farm Department in conducting some feeding experiments with cattle, which we believe will give valuable results. The work has been in progress only a short time. The results will be published in bulletin form when the work is completed.

STATION REPRESENTATIVES AT SCIENTIFIC ASSOCIATION MEETINGS.

The station has been represented at the following meetings of associations representing scientific work:

The Fertilizer Convention at Shreveport was attended by the Director of the stations, the Assistant Director and Horticulturist from Calhoun, the Chief Chemist from New Orleans, the Entomologist and Horticulturist from Baton Rouge. All of the parties mentioned presented papers at the convention, and took an active part in the discussions.

The State Agricultural Society and the Louisiana Stock Breeders' Association held their annual joint meeting at Shreveport and was attended by the Director of the stations, the Assistant Director and the Horticulturist fom Calhoun, the Veterinarian (who is Secretary of the Associations), the Horticulturist and the Entomologist from Baton Rouge.

The President of the University and the Director of the Stations represented the institution at the meeting of the Association of Agricultural and Mechanical Colleges and Experiment Stations, in annual convention in Washington, D. C. Immediately preceding this convention, the Director attended the convention of Farmers' Institute Workers of America at Washington, and a few days later attended the annual meeting of the Commissioners of Agriculture of the Southern States, at Richmond, Va. Reference to the tick conference at this convention is referred to elsewhere. At the solicitation of the honorable Secretary, James Wilson, the Director of the stations made two trips to Washington, D. C. (at the expense of the United States Department of Agriculture), to attend conferences of Directors of Experiment Stations of the Southern States.

The station was represented by the Veterinarian at the annual meeting of the American Veterinary Medical Association in Cleveland, Ohio, and at the Sixth International Live Stock Exposition at Chicago, Ill.

The Horticultural Department was represented at the annual convention of National Association of Nut Growers, at Dallas, Texas.

At the convention of the American Association for the Advancement of Science the stations were represented by the Horticulturist, Veterinarian and Director from Baton Rouge, the Assistant Director and several associates from New Orleans.

Excepting the Shreveport convention and those at Washington, and as noted above, the delegates to these conventions have met their own expenses.

A special run of the sugar house was made for the benefit of the Association for the Advancement of Science, and the Association in a body visited the station. About 150 of the distinguished scientists spent several hours in the sugar house and laboratories.

The stations always have a representative at the monthly meetings of the sugar planters in New Orleans, and have frequently contributed leading papers for discussion.

CHANGES IN STATION STAFF.

On the first of August, 1905, Mr. P. L. Hutchinson, Chief Chemist, and one of the most efficient men that we have ever had, resigned to accept a position with the National Department of Agriculture. Mr. R. C. Holtzclaw, Assistant Chemist, resigned in November to accept a position with a commercial firm. Mr. G. H. Hardin, Assistant Chemist, was given a leave of absence during the grinding season, and accepted a position in a sugar house. He is now at work again in the laboratory. Mr. A. T. Felt, Assistant Chemist, was employed in August and resigned in December to accept a position with a commercial firm. Mr. A. B. Joffrion and Mr. R. L. Menville, graduates of the University last year, have been added to our staff. Mr. J. E. Halligan has been promoted to the position of Head Chemist. Mr. H. C. Tullis has been made Secretary and Librarian at the Baton Rouge office.

FARMERS' INSTITUTES.

The members of the station staff at all of the stations continue to take an active part in Farmers' Institute work.

The Director of the stations also visited quite a number of the Summer Normal Schools for teachers, and delivered lectures on teaching agriculture in public schools. This is the first year this work has been undertaken. The results in general have been encouraging.

ANALYSIS OF FERTILIZERS, FEED-STUFFS AND PARIS GREENS.

The number of analyses made the past year of fertilizer samples was about 25 per cent less than that of the previous year. This is the first opportunity to report on the year's work under the feedstuff law, as that has been in operation only sixteen months. During the first twelve months of the operation of this law we analyzed 1600 samples of mixed feeds.

The number of Paris green samples analyzed was about the same as was received in 1904.

Under the laws for controlling the sale of fertilizers, feedstuffs and Paris greens, every citizen in the State is amply protected from fraud and imposition by unscrupulous dealers, and there exists absolutely no cause for distrust in the purchase of these articles, if the farmer will but claim the protection offered him. The sellers of good wares are protected, as ample facilities are afforded them of properly advertising their goods.

The accuracy of the work of the Analytical Department has been such as to retain the absolute confidence of dealers and purchasers, and with tankage fertilizers the buyer and seller frequently make a contract to settle the price of the fertilizer on the basis of our analysis of the samples taken.

All brands of fertilizers must have stamped in plain letters and figures on the sack the guaranteed composition, and each sack must be tagged by the Commissioner of Agriculture. The repeated inspection and analysis of the different brands is for the purpose of seeing that the manufacturer constantly maintains his product up to the standard guaranteed. The same remarks would hold good as applied to mixed feeds.

Paris green is largely used in this State as an insecticide, chiefly for the destruction of the cotton caterpillar, whose ravages are frequently so injurious. This chemical consists chiefly of the "arsenite of copper," with a small proportion of the acetate of copper, and a first-class article should contain not less than 50 per cent of arsenious acid, known in its pure state as white arsenic. This article is frequently adulterated, and there are abundant opportunities for fraud in its purchase.

All of the samples analyzed the past year were up to the standard.

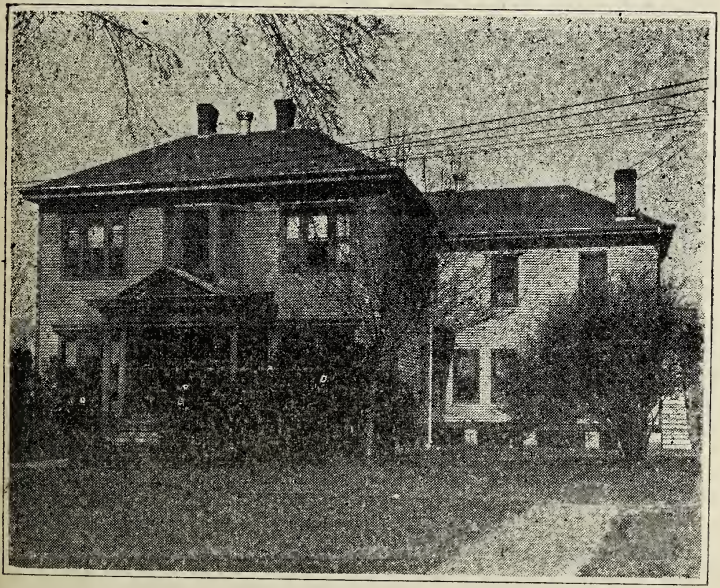
At the present time, when we read of litigations in Northern

States, growing out of insufficient protection of the farmers against frauds and adulterations in fertilizers, it is gratifying to know that we have outstripped a great agricultural State like Illinois in this line of progress.

During the past year three more Southern States have followed Louisiana's example in making an effort to secure legislation to control the sale of mixed feeds. These efforts have been only partially successful, but in a few years, it is evident, all of the Southern States will have similar laws. Our law for the control of feedstuffs is somewhat defective and efforts should be made to perfect it at the next meeting of the Legislature.

MISCELLANEOUS ANALYSES.

The main bulk of fertilizer samples comes in during the first six months of the year. In order to handle this business with promptness we are forced to employ a greater number of chemists than are required for the dull season. This affords opportunity during the late summer and early fall to do considerable miscellaneous work for the accommodation of the public. This includes the analyses of soils, waters, deposits that are



OFFICE AND LABORATORIES, STATION NO. 2, STATE STATION, BATON ROUGE, LA., SHOWING RECENT ADDITION OF EAST WING.

thought to contain minerals, fertilizers or other valuable elements, and many other classes of samples, the results of which may or may not be of public or semi-public interest, according to results obtained. No charge is made for this work.

NEW LABORATORY.

During August, 1905, the laboratory equipment was moved from New Orleans to Baton Rouge. An addition to the station laboratory was constructed to give ample facilities for the work, and we now have probably the best and most conveniently arranged laboratory for this class of work that is to be found in the South.

STATION NO 3.

NORTH LOUISIANA EXPERIMENT STATION.

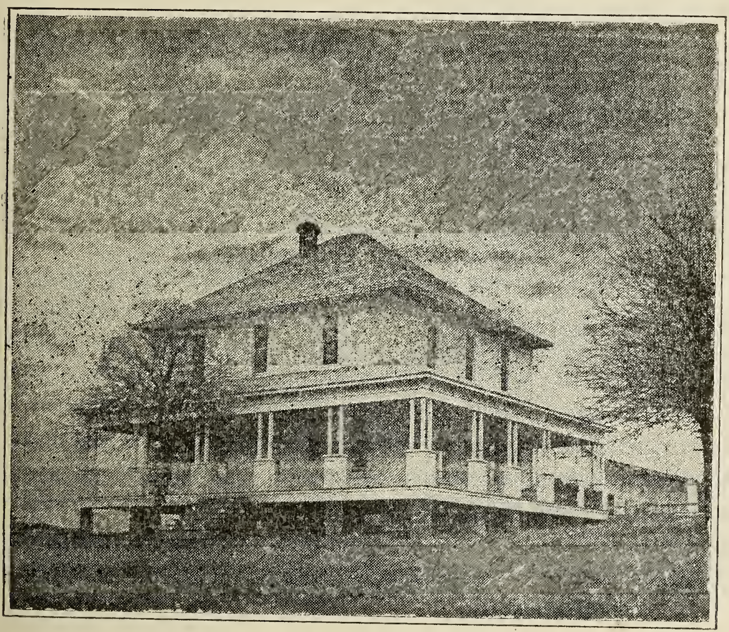
This station is located at Calhoun, Ouachita Parish, in the hill section, and is now under the direction of J. G. Lee.

As noted in the last annual report, fire destroyed the tobacco barn, laboratory and residence a little over a year ago. The insurance on these buildings, amounting to $3165, was promptly paid by the Louisiana Fire Insurance Company.

RESIDENCE OF THE ASSISTANT DIRECTOR, STATION NO. 3, NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA., ERECTED IN 1905.

A new residence has been erected at a cost of about $2500 complete.

Instead of rebuilding a chemical laboratory, we have put up a two-story building at a cost of a little over $3000, containing a large library and office room, a comfortable room for the exclusive use of ladies, a museum room and sleeping rooms that can be used by visitors when all can not be entertained at the cottage. It is the opinion of all visitors since the completion of the building that this fills a long-felt want. It is our purpose to fill the museum room with specimens of agricultural plants grown on the station, photographs of crops and animals, charts and diagrams, illustrating investigations that have been carried on at the station.



OFFICE AND LIBRARY, STATION NO. 3, NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA., ERECTED IN 1905.

FARM CROPS.

The experiments on cotton, corn and forage crops have been a continuation of the lines of work reported in previous years.

We are now clearing additional land to enlarge our pasture, preparatory to extending operations in general farming, taking up a number of experiments in the way of getting more accurate data as to the value of live stock in aiding to maintain the fertility of soils, or renew productiveness of worn soils.

THE DAIRY.

The dairy at the station has never been fully re-established since it was necessary to destroy a number of our herd in order to get clear of tuberculosis. We have recently secured some high-bred Jersey cows, and expect to put the dairy work in shape to give scientific and practical results more pronounced than has heretofore been possible.

TRUCK CROPS.

The past season has been very unfavorable for nearly all truck crops. The plan by which we had hoped to work in co-operation with the farmers and make considerable shipments of truck to distant markets was almost a complete failure, due very largely to unfavorable weather.

Some of the truck crops on the station were very successful, especially the late crops, and good markets were found for most products at Shreveport and Vicksburg, at prices that would be profitable to the farmer if he would supply what is desired. It is to be regretted that such an unfavorable season should have been experienced just at this time. While the disappointments have been somewhat discouraging, we feel very much gratified to note the general interest being manifested in truck and fruit growing throughout North Louisiana. The station at Calhoun has contributed a very important part in awakening and stimulating this interest.

The station will have this year an acre of strawberries and an acre of asparagus for commercial experiments.

We are putting out a stock of grapes for future work in breeding, using the scuppernong and muscadine grapes to cross with the more highly improved varieties, hoping to secure thereby a prolific bearing strain that will retain the resistance to destructive diseases that characterize the scuppernong and muscadine. We are also introducing the improved dewberries and blackberries. The fine quality and hardiness of these native fruits would seem to indicate that we should be able to produce perfection in these fruits by giving the subject proper attention.

FRUIT CANNING.

Work has been continued along the line of canning various fruits, with very satisfactory results. The tomatoes grown and canned at Calhoun have been pronounced by competent judges to be of very superior quality. Several housekeepers have said that they are equal to, if not better than, the best tomatoes that can be had on the market. While it was our purpose to show that the crop could be profitably canned at times when the market for fresh tomatoes was dull, we have shown that it could be made remunerative to raise tomatoes solely for canning purposes. Another result of the work along this line has been to set the people to thinking more of the art of preserving fruits and vegetables in attractive form and for home use, and the growth of an enterprise that contributes greatly to better home living has been very marked.

Bulletin No. 81, published early in the year, gives general instructions for preparing hotbeds, cold frames, fertilizing and cultivating truck crops, varieties best suited to the soil and climate of North Louisiana, and other information necessary to successful truck growing. A report is also given of the results of experiments in marketing fruits and vegetables. The second portion of the bulletin deals with canning and preserving, giving full directions for successful work of this nature.

LIVE STOCK.

There has been no change in the plan of work previously reported along the line of live stock breeding and feeding, save that already referred to in connection with the dairy. It will be our policy in the future to carry a less number of breeds and a larger number of individuals of the breeds retained for experimental purposes.

Preparations are now being made to carry on some experiments with poultry on a larger scale than has heretofore been undertaken. Interest in this subject has been very manifest for the past year, and we have received a great many inquiries for bulletins on the subject.

AGRICULTURAL FAIRS.

The long years of earnest work of Dr. Stubbs and Major Lee and their associates in stimulating an interest in an annual fair at the station are coming to fruition in the successful parish fairs now being conducted mainly by men who caught their inspiration from Calhoun. It was a long time before the people could be induced to begin, months before hand, to prepare material for these fairs. They have caught the proper spirit, however, and this has resulted in bringing the station in touch with many people whom it would not have reached otherwise. When they become interested in the fairs they begin to study more closely varieties of farm crops, methods of fertilization, cultivation, etc. Many of them come to the station for this information. This is but one illustration of the many ways in which we are aiding the people in raising their standards in agricultural lines. We expect to extend this work as much as possible, and establish a correspondence school among the boys and girls that are on the farm, and get them interested in making special preparation for these fairs, and at the same time in studying the fundamental problems of successful farming.

STATION STAFF.

Mr. George H. Malone, dairyman, resigned during the summer to engage in other business. His place will soon be filled by a competent dairyman from a dairy school. Mr. D. N. Barrow, Assistant Director, resigned the first of January, 1906. Major J. G. Lee has been appointed to fill the vacancy. The work there is not new to Major Lee, as he had immediate direction under Dr. Stubbs during the period of the station's greatest development. The people of North Louisiana all know him, and he has their undivided sympathy and support. E. J. Watson, Horticulturist, and T. I. Watson, in charge of the farm plats, are most competent to carry on the work committed to them, and both enjoy the confidence and esteem of the people. I therefore feel very confident that the influence of this station will continue to grow, and that its usefulness will be felt more keenly and over a constantly expanding territory.

STATE GEOLOGICAL SURVEY.

Dr. G. D. Harris, with two assistants, is now in the field, on surveying work, where they will remain until the middle of March. Dr. Harris devotes one-half of his time to the survey work, and one-half to Cornell University. During the past year three publications have been issued, giving the results of work done.

Bulletin No. 1, on the "Underground Waters of Louisiana," contains ninety-one pages, with maps, diagrams and half-tone plates from photographs, and an appendix of seventy-three pages, giving a dictionary of altitudes of North Louisiana.

Bulletin No. 2 details the work on "Terrestrial Magnetism and Meridian Lines." This work will be of exceedingly great value to surveyors and engineers. It covers forty-nine pages, exclusive of a considerable number of maps and diagrams.

Bulletin No. 3 is a report on the establishment of tide gauge work in Southwest Louisiana. This gauge is now maintained, and the services of a keeper paid for, by the United States Coast and Geodetic Survey. This Department of the National Government agreed to maintain the gauge if we would install it and begin the record. Since the last annual report to your Excellency our part of the work has been completed. We can secure duplicates of the records whenever we desire them.

Results of this work will be of scientific interest and of practical value. In a few years we should get some reliable data as to whether or not the coast marsh of that region is sinking. Determination of the mean tide level will be of great value in determining the boundaries of certain property interests that are destined to be of increasing importance.

Bulletin No. 4 is nearly completed, and will be published in a short time. It deals with the character and extent of the rock salt deposits of Southwest Louisiana.

Work during the summer and the latter part of the year has been carried on in the region of Winnfield, in North Louisiana. Work was taken up in that district on account of the sandstone, limestone and salt deposits in its limits. It seemed desirable to have complete and accurate maps of certain areas of the State most interesting from a geological standpoint, not alone for their own value, but to encourage co-operation from the National Government in the construction of such maps for territory in Louisiana. Results here would also be more patent and in many respects furnish the best basis for future geological work. We have been mapping in great detail an area of nine townships about Winnfield. A report on this work is also well under way and will appear soon.

Investigations in continuation of our work on clay, lignites and oil will be taken up at the earliest possible date.

SOIL SURVEY.

The Bureau of Soils of the Department of Agriculture at Washington has re-assigned a corps of men to work in Louisiana. Since the last report of the Director, East Baton Rouge Parish has been surveyed. Winn Parish will next be surveyed. This work is done entirely at the expense of the United States Depatment of Agriculture, and the results furnished to the State Geological Survey. A limited number of copies of the publication are sent us for distribution. Dr. Whitney, Chief of the Bureau of Soils, has been exceedingly kind in offering to assist Louisiana to the fullest extent possible from his available funds. In the future he will survey the parishes of which topographical surveys have been made, so that when we have completed the work along all of these lines it can all be correlated and be of the greatest possible value.

UNITED STATES GEOLOGICAL SURVEY.

A few years ago co-operative work with the United States Geological Survey was begun under an agreement to make topographical surveys of certain portions of Louisiana. We contributed $2500 toward the expenses of this survey for each quadrant surveyed. Last year an effort was made to get the National Department to meet all the expense of this work, so that we would be enabled to do more work in other lines. The following letter will show how generous the Director of the Survey has been to the plea presented to him:

Department of the Interior,
United States Geological Survey,
Washington, D. C., May 12, 1905.

Director W. R. Dodson, Louisiana Agricultural Experiment Station, Baton Rouge, La.:

Sir—Replying to yours of February 18, urging that this survey map Baton Rouge, La., quadrangle—

I take pleasure in advising you that in plans for topographic surveying for the season of 1905 a sufficient sum has been provided to commence the survey of this area, which covers about 1000 square miles. The amount of money which would be required on this one quadrangle, however, is so great, about $9000, that it will probably be another year at least before the work can be completed. This work will be commenced early in the fall by a party under the charge of Mr. Duncan Hannegan, topographer. Very respectfully,

(Signed) CHAS. D. WALCOTT, *Director.*

It is hoped that the work will be continued till the whole State is accurately surveyed. This work will be of great value in construction of roads, railroads, drains, and will be of inestimable value in mapping the State. In the section of the country where we seek immigration the idea is quite prevalent that Louisiana is one vast flat, mainly composed of swamp land and inhabited by mosquitoes, alligators and snakes. A topographical map of the State would be of greater value than any other printed literature in dispelling this erroneous impression.

The following constitutes the present staff of the stations:

W. R. Dodson, A. B., B. S., Director, Baton Rouge, La.

R. E. Blouin, M. S., Assistant Director, Audubon Park, New Orleans, La.

J. G. Lee, B. S., Assistant Director, Calhoun, La.

S. E. McClendon, B. S., Assistant Director, Baton Rouge, La.

C. A. Browns, Jr., Ph. D., Chemist, Audubon Park, New Orleans, La.

H. P. Agee, B. S., Chemist and Sugar Maker, Audubon Park, New Orleans, La.

Clifford Waldron, Farm Manager, Audubon Park, New Orleans, La.

J. K. McHugh, Secretary and Stenographer, Audubon Park, New Orleans, La.

G. D. Harris, M. S., M. A., Geologist, Baton Rouge, La.

J. L. Rich, Assistant Geologist, Baton Rouge, La.

F. L. Whitney, Assistant Geologist, Baton Rouge, La.

J. E. Halligan, B. S., Chemist, Baton Rouge, La.

J. A. Hall, B. S., Chemist, Baton Rouge, La.

R. L. Menville, B. S., Chemist, Baton Rouge, La.

A. B. Joffrion, B. S., Chemist, Baton Rouge, La.

G. H. Hardin, B. S., Chemist, Baton Rouge, La.

Roger P. Swire, Treasurer, Baton Rouge, La.

L. C. Reid, Farm Manager, Baton Rouge, La.

Wilmon Newell, M. S., Entomologist, Baton Rouge, La.

F. H. Burnette, Horticulturist, Baton Rouge, La.

W. H. Dalrymple, M. R. C. V. S., Veterinarian, Baton Rouge, La.

H. C. Tullis, Secretary and Librarian, Baton Rouge, La.
E. J. Watson, Horticulturist, Calhoun, La.
Ivy Watson, Farm Manager, Calhoun, La.
________________, Dairyman and Poultryman, Calhoun, La.

The bulletins and reports will be sent free to all farmers by applying to the Director of the stations, Baton Rouge, La.

The following is a copy of the financial report sent to Washington, D. C., in compliance with Act appropriating money for Experiment Stations:

FINANCIAL STATEMENT.

	Cr.	Dr.
Receipts from the Treasurer of the United States for the year ending July 1, 1905		$15,000 00
By salaries	$13,670 98	
Publications	1,329 02	
	$15,000 00	$15,000 00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Station of the Louisiana State University and Agricultural and Mechanical College for the fiscal year ending June 30, 1905, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000, and the corresponding disbursements are $15,000, for all of which the proper vouchers are on file and have been examined by us and found correct.

(Signed) J. G. Lee,
Commissioner of Agriculture and Immigration.
H. L. Fuqua,
Vice President Board of Supervisors and Ex-Officio Member of Board of Agriculture.

SUPPLEMENTARY STATEMENT.

To receipts from other sources than the United States for the year ending July 1, 1905:

	Cr.	Dr.
Cash on hand July 1, 1904		$10,194 42
Insurance on buildings burned		3,165 00
Sale of farm products		2,233 12
Miscellaneous		6,000 00
Received from State appropriation		15,000 00
By salaries	$ 2,123 33	
Labor	6,122 50	
Freight and express	602 32	
Heat, light and water	405 55	
Chemical supplies	15 99	
Seeds, plants and sundry supplies	977 55	
Fertilizers	451 56	
Feeding stuffs	1,434 19	
Tools, implements and machinery	432 50	
Furniture and fixtures	959 88	
Scientific apparatus	122 83	
Live stock	1,498 70	
Traveling expenses	275 10	
Contingent expenses	1,475 43	
Buildings and repairs	2,908 62	
Insurance	117 50	
Publications	18 60	
Postage and stationery	527 53	
Library	510 33	
Balance on hand July 1, 1905	15,612 53	
	$36,592 54	$36,592 54

The reports of receipts and expenditures of the Geological Survey and the fertilizer fund are examined by the same Board as the above, and approved by them. They are sworn to by the Director of the stations, and have been published in the Baton Rouge Times. These reports are published twice a year.

The following bulletins are available for distribution to parties who are interested in the subjects to which they pertain:

Bulletin No. 60—Charbon (Anthrax).
Bulletin No. 61—Rice; Preparation, Cultivation, etc.
Bulletin No. 62—Report of North Louisiana Experiment Station, Calhoun, for 1899.

Bulletin No. 63—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 64—Report of the Veterinarian.

Bulletin No. 65—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 66—Sugar Cane; Experiments in Cultivation.

Bulletin No. 67—Broom Corn; How to Grow and Cure It.

Bulletin No. 68—Home-Grown versus Purchased Seed.

Bulletin No. 69—Pecans and Pecan Culture.

Bulletin No. 70—Cane Borer (*Diatroea Saccharalis*).

Bulletin No. 71—Report of North Louisiana Experiment Station, Calhoun, for 1901.

Bulletin No. 72—Forage Crops, Grasses and Clovers.

Bulletin No. 73—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 74—Sheep; Different Breeds, Internal Parasitic Diseases, etc.

Bulletin No. 75—Preservation of Cane Syrups, and Yeasts, Moulds, Bacteria and Enzymes.

Bulletin No. 76—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 77—Rice.

Bulletin No. 78—Comparative Results of Seedling Sugar Canes, D. 74 and D. 95, with Our Home Sugar Canes (Louisiana Striped and Louisiana Purple).

Bulletin No. 79—Results of Experiments with Nodule Diseases of the Intestines of Sheep.

Bulletin No. 80—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 81—Results of Experiments in Production and Marketing Fruits and Vegetables, and Canning Fruits and Vegetables on a Small Scale at the North Louisiana Experiment Station, Calhoun, La.

Bulletin No. 82—The Texas Fever Cattle Tick Situation, and the Eradication of the Tick by a Pasture Rotation System.

Bulletin No. 83—Results of Further Experiments with Nodule Disease of Sheep; Bare Lot Method of Raising Lambs.

Bulletin No. 84—Texas Fever.

NINETEENTH

ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

LOUISIANA STATE UNIVERSITY

AND

A. AND M. COLLEGE

FOR 1906,

TO THE GOVERNOR.

BY W. R. DODSON, DIRECTOR.

BATON ROUGE:
The Daily State Publishing Company, State Printers
1907

NINETEENTH
ANNUAL REPORT
OF THE
AGRICULTURAL EXPERIMENT STATIONS
OF THE
LOUISIANA STATE UNIVERSITY
AND
A. AND M. COLLEGE
FOR 1906,

TO THE GOVERNOR.

BY W. R. DODSON, DIRECTOR.

BATON ROUGE;
The Daily State Publishing Company, State Printers
1907.

LOUISIANA STATE UNIVERSITY

AND

Agricultural and Mechanical College.

OFFICE OF

STATE EXPERIMENT STATIONS.

Baton Rouge, La., Feb. 1, 1907.

To His Excellency, Newton C. Blanchard, Governor of Louisiana:

Sir—In accordance with the provisions of section 2 of the act of Congress to establish Agricultural Experiment Stations in connection with colleges established in the several states under the provisions of an act approved July 2, 1862, and the acts supplementary thereto, I beg leave to submit a report of the operations of the Louisiana Agricultural Experiment Stations for the year ending February 1, 1907, including a statement of the receipts and disbursements from July 1, 1905, to July 1, 1906.

Station No. 1, Sugar Experiment Station,

Audubon Park, New Orleans.

Mr. R. E. Blouin has remained in active charge of the work of this station, and has very ably administered its affairs and conducted the experiments in field and laboratory in a thoroughly scientific and practical way. The field of investigation has been somewhat enlarged, and very valuable results have been obtained, both from a technical and a practical standpoint.

The year 1906 has been a bad year for the sugar interests of the State. The spring was cold and wet, and stubble cane suffered severely throughout the State. When warm weather came it was accompanied by drouth, which in turn was detrimental to the growth of the cane crop. Accordingly the yields throughout the State were poor, much below the average, both in tonnage and sugar content. The crop at the station was well up to the average in tonnage, but was deficient in sugar content.

IRRIGATION.

The tonnage secured again emphasizes the necessity of thorough preparation of the land in the fall and the value of irrigation. Irrigation was resorted to twice, on May 29 and and June 20, and is to a large extent responsible for the good tonnage secured. The plats comparing irrigation and non-irrigation canes were in second year's stubble this year, and owing to imperfections in the stand of cane, cannot be strictly compared; however, the results show a marked improvement in the cane by irrigation.

FERTILIZATION AND CULTIVATION.

The study of the fertilizer requirements of D. 74 has been continued and new experiments added, and the results are now showing good promise, though it will require some time before positive results can be secured.

We also started fertilizer experiments on succession cane and various combinations on the home varieties. With cultivation experiments our results show markedly the advantage of frequent and shallow cultivation. To this we have added one new implement this year which is still in its experimental stage, though giving promise of good results. This is the ordinary harrow with a bull-tongue in the center, making a clean sweep of the middles of the rows, using a disc and bull-tongue for our middles instead of the shovels now so popular in the State. Experiments with new implements in the preparation of the land have also been inaugurated, breaking land at different depths and in a different manner, and we are testing the deepest possible breaking of the land in Louisiana. We look forward to some very interesting results from these experiments. They are conducted upon both sandy and stiff lands.

SEEDLING CANES.

The D. 74 and D. 95 seedling canes have again maintained their superiority over the home canes, not only on the station, but throughout the State, the result being a large extension of the area planted in these canes this year. This applies particularly to the D. 74, which is highly commended by practically all planters. An extended report was made to the Sugar Planters' Association and published in the Louisiana Planter and Sugar Manufacturer (and will later be published in bulletin form) on the results from these two seedlings compared with home canes during this year, which was favorable in every instance to the new canes, both from a field and sugar house standpoint. At the station here the D. 74 showed itself markedly superior to either the home or D. 95, the tonnage being greater and the sugar content very much greater than the home cane, and markedly greater than the D. 95, also being richer in sugar than the home cane.

New seedling varieties were introduced this year from Jamaica, Java and Barbados, and they have now been placed in our regular variety plats to compare them with other canes. We have also secured from the Hawaiian Islands a quantity of cane seed, and have for the first time successfully germinated these seed in Louisiana, and we have now Louisiana seedlings which are ready to be placed in the field. In December we received another consignment of cane seed from the Hawaiian Islands. These have been planted and have germinated remarkably well, and we have every hope from this germination to secure a number of seedlings from these plantings. There are prospects that some of these will develop into very desirable canes for Louisiana.

SUGAR HOUSE WORK.

In the sugar house we continued our experiments comparing the home and seedling canes from a sugar manufacturing stand point, and investigated carefully the amount of clarifying agents left in our products during manufacture. This is particularly of interest now, owing to the Pure Food Law being in operation, and these experiments were conducted in order to post ourselves in advance as to the composition of these products.

LABORATORY WORK.

The laboratory has been investigating the composition of molasses, and the effects of the different agents in clarification upon this molasses and the amounts of these agents remaining in it. This entailed an immense amount of analytical work, which is not yet completed. The results are very interesting, and will have value in relation to the application of the new Pure Food Law to our cane industry.

A study of the effects of the different fertilizing ingredients on the composition of cane has not been quite completed, and this work will be continued.

Dr. C. A. Browne, our efficient chief chemist, resigned to accept a position in the sugar laboratory of the Bureau of Chemistry Department of Agriculture at Washington, much to our regret, as his services had shown him to be an extremely able and efficient worker. His place has been filled by Dr. Fritz Zerban, who was Carnegie Research Chemist at the college of the city of New York.

CANE LOADERS.

We had two trials of cane loaders this year. The object of the demonstration was to exhibit the different models and bring before the planters the improvements that had been made in these machines. At the first trial, held May 9, there was a very fair attendance, with only two machines on trial. These were the Moline and Guassiran cane loaders. At the second trial there were present the following loaders: Moline, Luce, Castegnos, Landry and Mire. These five loaders were given a thorough trial in exhibiting their respective merits, and this trial was the most successful one ever conducted on the station. There were over three hundred planters in attendance from every part of the State, and they were given an excellent opportunity of viewing the working of the different loading devices.

CANE HARVESTERS.

We have continued testing cane harvesters here, several tests being made, and it is gratifying to note that there is some improvement in these machines. The number of patentees of these devices are increasing, and some of them are at work in this State. The outlook is very hopeful for success in this line, and when this has been accomplished it will be a great relief to the sugar planters in the labor problem. The D. 74 cane is considered extremely desirable by the cane harvester men, the majority of them making their harvesters to handle only this cane. This is due to its erectness under all conditions, giving us straight cane to be handled by the harvester.

IMPROVED IMPLEMENTS.

This station has tried a number of new agricultural implements this year and discussed with the various manufacturers alterations pertaining to them. All manufacturers, agents and inventors are invited to test their implements here, and we are glad to encourage such tests, and visitors to the station are welcome to witness them.

SUGAR SCHOOL.

The demand for graduates of the Audubon Park Sugar School of the Louisiana State University and Agricultural and Mechanical College has increased this year, and we are unable to supply the demand from sugar countries that come to us for such graduates. While the students are down here they are given practical instruction in agriculture, chemistry and sugar house work.

COTTON.

Cotton has again been planted and the usual tests made of the various standard varieties, and new varieties have been introduced. These are grown here to test their merits upon alluvial soil, and have this year produced very good crops, over two bales per acre being secured from the better varieties. Again, no boll weevils have been found this season, and we are positive of the complete extermination of the weevils, which were placed on the station in 1903.

CORN.

This crop was very good this year, giving us a good average yield, and we tested a number of varieties, also testing home-grown versus purchased seed, and again our home-grown seed has given better results. The station has had a number of inquiries as to a weevil-proof corn—or one approximately near that—and we have found here that the improved variety of Yellow Creole is markedly resistant to the attack of the corn weevil.

FORAGE CROPS.

Besides continuing experiments with a number of varieties that hitherto have been carried on, such as alfalfa, red and crimson clovers, sorghum, teosinte, beggarweeds, cow peas and vetches, we have this year co-operated with the United States Department of Agriculture in the introduction of new varieties of alfalfa and clover from various sections of the United States and also from foreign countries. The results are very interesting and full of promise.

FIBER CROPS.

The station is continuing its experiments with these crops, and inventors of decorticating machines make frequent application for ramie, jute and hemp; the quality of fiber this year has proven very satisfactory. These crops, however, are awaiting the development of a practical decorticating machine.

OLIVES.

Our olive trees are still healthy and vigorous growers, though not fruiting as prolifically this year as last; there was very little fruit on them this year and the *Pendulina*, the variety which fruited last year, when it came to maturity, was the only one that had fruit on it this year, though not the *same tree* that fruited last year.

CITRUS FRUITS.

We have continued our growth of citrus fruits, enlarging the number of varieties, which this year have suffered very markedly from an attack of scale insects and the white fly.

The method of spraying for the extermination of the scale insect, which has proven efficient in other sections, is here complicated with another problem, namely, the control of the small ant that has become so numerous in the vicinity of New Orleans. These ants carry the insects and replant them on trees after they have been sprayed, and thus vitiate the results of spraying. We are now making arrangements with the Crop Pest Commission to carry on in co-operation with them some investigations looking to the control of this pest under the new conditions. It is to be regretted that the funds of the station will not permit the employment of an entomologist to devote his time to the study of the ant, as this insect is proving a great annoyance to all housekeepers in the infected territory, and will probably become a menace to our orange groves, and possibly to our sugar interests. Our hybrid oranges fruited to a large extent this year, though likewise suffering from insect attacks. The object of experimenting with these hybrids is to see if we cannot get an edible orange that will withstand our coldest weather here without protection.

MISCELLANEOUS WORK.

The assistant director, Mr. Blouin, has rendered most valuable services to the sugar interests of the State in aiding to protect these interests against unreasonable and unjust exaction of the committee in charge of the enforcement of the Pure Food Law, recently passed by Congress. He has made two trips to Washington, D. C., with other parties to present our claims to the committee of Congress and to the Commission. Mr. Blouin was the accredited representative of the Sugar Planters' Association in these hearings. The work done has borne good fruit, resulting in the prevention of great losses to the value of the sugar products of the crop of 1906 that would have otherwise been sustained by the enforcement of the law as interpreted by the authorities, prohibiting the use of sulphur and lime in bleaching and clarifying the cane juice.

CHANGES IN STATION STAFF.

Mr. J. C. Waldron, who was farm manager of the station, resigned to accept a more lucrative position in Antigua, B. W. I., and his place has been filled by Mr. A. E. Dodson of Missouri.

Station No. 2, State Experiment Station,

Baton Rouge.

The experiments at the farm have continued under the immediate supervision of Mr. S. E. McClendon, assistant director of this station. His work has been done faithfully and well.

We are here carrying on a considerable number of experiments in which results of a long series of years are required for tabulation. These experiments have been referred to in previous reports, and need no extended notice at this time. They involve questions of soil fertility, values of the different sources of fertilizing elements, variety tests of standard crops, rotation of crops and so forth.

CATTLE FEEDING.

A considerable number and diversity of feeding experiments have been conducted during the year. Upward of fifty head of cattle have been fed under various experiments the latter part of the year, and a slightly less number during the early part of the year. The subjects have included a comparative study of the values of different combinations of available feed stuffs, the comparative returns from feeding animals of different ages, the value of the droppings as a fertilizer and related subjects. We have also compared the value of green feed, ensilage, dry hay and mixtures of hay and ensilage as sources of forage. Much valuable data has been secured from this work, but the results are not conclusive and not entirely satisfactory. The results with full comments will be published in bulletin form.

For the feeding experiments a silo was constructed the past summer, with a capacity of ninety tons ensilage. The silo was filled with sorghum, Japanese cane, grass and corn, with unqualified success.

STOCK BREEDING.

The work previously reported in the production of high grade beef animals has been continued. We now have some fine types of the Angus and Hereford breeds that have been raised on the station grounds. While these are most creditable animals, they have not reached maturity as soon as they would, had they not had the Texas fever, which we are fully convinced dwarfs the full development of the animal. These steers weigh at this time about twelve hundred pounds. Had they not had the fever to contend with I believe they would weigh by this time at least fifteen hundred pounds. So that while we have solved the problem of protecting the animal against death from Texas fever, we have not yet solved the problem of complete protection, without the extermination of the cattle tick. However, we have completely demonstrated the possibility of exterminating the cattle tick in areas that can be protected from cattle that roam at large. The question of exterminating the cattle tick now becomes the great problem in live stock production in the South.

A disease of the eye, commonly called "pink eye," (contagious ophthalmia) has been a source of severe discomfort to young animals, and in frequent instances has destroyed the sight of an eye in calves. The improved blood seems to be more subject to annoyance from this disease than is the native. It is possible that with the removal of the tick the increased vitality of the calf will result in greater resistance to this disease also.

At the present time we have on the station about thirty-five head of Angus cattle, mostly high grades, and about fifteen of the Hereford breed, also high grades. Some of these animals would be very satisfactory animals any where, for their class, but some are unsatisfactory, and we are unable to account for the difference. It is now our purpose to take up the effects of tick infection and fever of the mother on fetal nutrition and development.

This station has recently purchased a pair of Angus calves from the celebrated herd of D. Bradfute & Son, Cedarville, Ohio. It is hoped that some fine animals will be developed from this purchase.

SWINE FEEDING.

Some interesting results have been obtained from feeding experiments with pigs, with and without pasture. The value of sweet potatoes, Dwarf Essex rape and oats as a pasture crop in the production of pork has been further investigated. The feeding of rice polish to pigs has been continued with good results. All these results will be published in bulletin form when the work is completed.

BOLL WEEVIL.

Unfortunately the boll weevil continues to make rapid progress in the invasion of the State. Points near the Ouachita River have been reached, and by the close of the year 1907 this pest will be found in all but the most easterly parishes of the State. The past season has fully demonstrated to those in the heavily infected territory that moderate crops of cotton can be raised in the presence of the boll weevil if the planter follows an intensive system of cultivation, and fertilizes and selects his seed for early maturity. The stations have for many years advocated (from the results of many carefully conducted experiments) careful and thorough preparation of a deep soil bed, then shallow cultivation of the crop at frequent intervals. This, with rotation and selection of seed, is the solution of the question of growing profitable cotton in the boll weevil infested territory, as far as it has been solved at the present time. The people do not feel the apprehension on this subject that they did two years ago. In some instances undue alarm is felt at the present time. It is a source of gratification, however, to know that by the best system of agriculture in vogue we may still grow cotton as our principal money crop in the cotton section. The station is doing all it can to aid in facilitating adaptation to the new conditions.

Horticultural Department.

The work of this department has been continued under the direction of Prof. F. H. Burnette. The variety tests of fruits and vegetables have been continued, and some special lines have received attention. In co-operation with the United States Department of Agriculture there has been under observation a number of new or rare plants imported from foreign countries, or results of breeding work of men connected with the national department. The most important of the latter class are the Citranges. These are hybrids between the sweet and the hardy trifoliata oranges, and may possibly lead to something very valuable in the orange line, the purpose of the cross being to secure a desirable fruit that will not be destroyed by our winter freezes.

Experiments have been continued in cultivating plants in "half shade," under a frame covered with the wild cane for slats. The cloth house of last year was unsatisfactory, from the fact that it was not strong enough to endure the vicissitudes of the climate. Sufficient results have been obtained to show the marked superiority of foliage vegetables grown in half shade, because of their more tender tissue and superior flavor.

Fertilizer experiments have been continued with sweet potatoes, onions and sweet corn.

A few varieties of fruits of recent introduction have been added to the orchard. The work in pecans has been continued. Cuttings of the more desirable varieties of figs have been distributed over the State.

A small vineyard of improved varieties of scuppernong grapes has been planted and these, with the native muscadine, will form the basis for work looking to the improvement of our grapes through breeding.

The department has aided a number of high schools of the State by furnishing plans and materials for improvement of grounds and school gardens.

Veterinary Department.

Dr. W. H. Dalrymple has continued in charge of the work of this department, assisted the latter part of the year by Dr. H. J. Milks.

DISEASES OF SHEEP.

The chief experimental work has been a continuance of that connected with the parasitic diseases of sheep, more especially nodule disease of the intestines. This line of work was taken up some years ago, and the results have encouraged its continuation. Part of the past year was devoted to duplication and verification of previous experiments, and additional phases were under experiment, results of which are published in bulletin No. 89.

An intestinal parasitic disease of sheep, other than that above alluded to, has been found very destructive to lambs, and it is the intention of the department to pursue a line of investigation looking to the amelioration of the conditions. The disease is known as "parasitic gastritis," and is caused by the "Haemonchus contortus,' or twisted stomach worm, found in the fourth compartment of the stomach of the sheep.

BLACK LEG.

Owing to numerous inquiries regarding a disease of young cattle, which on investigation turned out to be "black leg," or symptomatic anthrax or charbon, a short bulletin of information on this subject was issued as bulletin No. 85.

FEEDING.

On account of the large number of inquiries and the growing interest in the subject of economic stock feeding, a full discussion of this subject was given under bulletin No. 86, entitled, "Our Available Stock Foods." This bulletin has met with very hearty appreciation by stock owners throughout the State. The bulletin gives all necessary data in regard to compounding and feeding our available feeding materials in this State for the most economic rations.

MISCELLANEOUS.

In February last Dr. Dalrymple represented the Experiment Stations in a hearing before the Committee on Agriculture of the National House of Representatives, in behalf of an appropriation bill, introduced by Congressman Ransdell of Louisiana, for aiding in the work of exterminating the cattle tick from the South. An appropriation of $82,500 was made for this work, and great good has already been accomplished in the expenditure of this money.

The correspondence of the department continues to increase, indicating a growing interest in live stock subjects.

Owing to the increasing demand for investigations along veterinary lines, and owing to the fact that Dr. Dalrymple's time is largely taken up in teaching work in the university, the station has employed an assistant, who will devote all of his time to research work. This has been made possible through the appropriation under the Adams act of the National Congress.

BACTERIOLOGICAL INVESTIGATIONS.

H. J. Milks, D. V. M., assistant veterinarian and bacteriologist.

Dr. Milks became a member of the station staff the latter part of July, 1906, and at once began investigations along the lines of diseases of animals.

ANTHRAX.

At the time he came to Louisiana there were several outbreaks of charbon in the State and several weeks were spent in getting all data possible in regard to this disease in the field. All sections of the State known to be infected were visited by Dr. Milks and all available cases of charbon were studied. On some of these trips he was accompanied by Dr. Hines, then employed by the Crop Pest Commission to study the horse fly and its relations to outbreaks of charbon. Unfortunately for the investigation, but fortunately for the live-stock interest, these outbreaks had almost subsided before our investigators reached the field. As soon as the field examinations were completed the work was taken up in the laboratory, where it has been actively prosecuted. He has been studying vaccines and the causes of the failure of vaccination, in many instances, to convey immunity to the disease. He is also making investigations on the development of the anthrax organism on various kinds of vegetable matter that may be found in field conditions; extracts from grasses, weeds, etc., such as may be found in the fields and meadows or woodlands.

We have made about all preliminary arrangements for the study of insects and birds and their relation to dissemination of diseases. The possibility of procuring an immunizing serum is also under investigation.

CEREBRO SPINAL MENINGITIS.

Some attention has also been given to the disease of the horse known as "cerebro spinal meningitis," and to a disease among young chicks which is not yet identified, and which may prove to be a new disease. The laboratory for this work has been very materially increased and additional room built at the Experiment Station building for the use of sterilizers, incubators, etc., and plans are being drawn at the present time for the construction of a hospital for diseased animals under treatment. We look forward to accomplishing great good in these lines of investigation.

Department of Plant Pathology.

This department was also organized in July, 1906, and was put under the direction of Mr. H. R. Fulton from Harvard University. He has been giving all of his time to the study of plant diseases.

COTTON DISEASES.

The cotton wilt, or black heart, disease has been quite prevalent in some sections of the State during the past season, and the destructiveness of the disease has greatly increased. Considerable time has been devoted to the study of this disease. No direct means have been found in destroying the fungus, but it is hoped that control measures may be perfected. Several distinct diseases of the cotton boll have occasioned in the aggregate large loss during this season. Special attention is being given to the study of the nature of these diseases with the hope of finding some remedy.

RICE DISEASES.

Observations made in the rice district during the harvest season reveals several diseases of the grain, none of them, however, having caused great loss this season. Among them are two smut diseases of recent introduction, which have proven to be very destructive to the grain in other countries. It has therefore been deemed advisable to undertake some investigations as to the effect of fungicides upon the spores of these smuts with a view of treating the rice seed before planting for the control of the disease.

SUGAR CANE DISEASES.

A fungus has been found generally present in cane fields of some sections of the State, and indications lead to the suspicion that this fungus plays a part in bringing about a diseased yield, especially of stubble cane. Experiments to determine the exact role of this fungus are now being carried on.

PEPPER WILT.

Noticeable loss, due to an undescribed wilt disease, occurred in the pepper beds of the Baton Rouge Station last summer. It has been definitely determined that the death of the plants was due to the attacks of a soil fungus belonging to the genus *Rhizoctonia.* The mode of attack of the fungus, affecting as it does the underground part of the plant, precludes the use of remedial measures in the case of plants already infected. Preventive measures will be tested during the next season.

MISCELLANEOUS.

The laboratory has been called upon from time to time to examine and to report on specimens of diseased plants, to make bacteriological diagnoses, and to determine the names of economic plants.

Rice Experiments at Crowley, La.

In co-operation with the United States Department of Agriculture and some of the progressive citizens of Crowley, rice investigations were inaugurated the past season. The lines of work begun include a study of the fertilizer requirements of rice, a botanical study of the plant and the introduction of all obtainable varieties, that their adaptability to our climate and soil may be tested. Reference has already been made to the work of the pathological department in studying rice smut.

The results of the work were not very satisfactory, due in considerable extent to the fact that the work was not inaugurated until late in the season and a prolonged drouth after the plots were planted. This year, with the levees already constructed, and the work under way, much more satisfactory results are anticipated.

The extent of the rice interests of the State would justify an expenditure of many times what we have been able to devote to this work, but the investigations cannot be extended without additional funds.

Station No. 3, North Louisiana Experiment Station,

Calhoun.

This station is located at Calhoun, Ouachita Parish, and has been under the supervision of Major J. G. Lee. Recently Major Lee's health has been such that he requested a leave of absence, which has been granted, and Mr. T. I. Watson for many years the efficient farm manager, has been in charge of the station. It is to be hoped that Major Lee will soon be restored so that he can resume the work there.

During the year we have made some improvements to the grounds, and have bored a deep well for securing water for general purposes. At 580 feet we secured excellent water in great abundance. This will solve a problem that has always troubled us during dry weather. We have heretofore been unable to get an unfailing supply of water.

Additional land has been cleared for the purpose of extending our experiments in the production of feed stuffs for dairy purposes, as well as in the fattening of beef cattle.

THE SILO.

A silo was constructed at this station during the summer and an ensilage cutter purchased. The silo was filled principally with corn. The product has kept in excellent condition, and is now being fed in some experiments in the dairy, and in fattening beef cattle. So far very satisfactory results have been obtained. There has been considerable interest manifested in this subject in that portion of the State.

THE DAIRY.

The dairy work has been resumed, but has not been without hindrances to its successful operation. We have been unable to get a competent and reliable dairyman, whose results could be depended upon for scientific accuracy. However, we have at the present time a good dairy herd and are training a dairyman that is a native of the vicinity, and it is hoped this work will go forward satisfactorily. It is our purpose the coming summer to make investigations on Texas fever and the cattle tick as related to milk production and the development of calves in utero.

TRUCK CROPS.

Much of the work previously reported has been continued. The new orchard should come into bearing this year, and the old orchard is now being destroyed. We are also enlarging the peach orchard for certain lines of experiments, and for this purpose new land is being cleared. About two acres have been cleared and set in trees. Considerable attention has been given to collecting the native seedling peaches and apples of the country. It is hoped that these may form the basis for some breeding experiments that will bring good results.

We have made all preliminary arrangements for conducting a full line of irrigation experiments in trucking this summer.

AGRICULTURAL FAIR.

The annual Agricultural Camp Meeting and Fair of the North Louisiana Agricultural Society was held in September on the station grounds. It was the opinion of many of the old citizens of the community that the fair the past season was the most successful ever held at Calhoun. The attendance was possibly not as large as at some of the earlier fairs that were held before the various parishes organized their parish fairs, but the products on exhibition were more varied and of greater excellence than ever seen before in North Louisiana.

PUBLICATIONS.

Bulletin No. 90, giving a summary of results obtained during fifteen years of work with fruits and vegetables, was issued in December. This was prepared by E. J. Watson, and is proving a popular bulletin, as it well deserves.

The State Geological Survey.

There has been no change in the management of the survey. Dr. G. D. Harris of Cornell University continues to devote one-half of his time to this work and one-half to Cornell University. The work has been actively prosecuted the past season. The survey of Winfield area has been completed and mapped, and the results are now being prepared for publication.

The latter part of the season has been given almost wholly to work in Southwest Louisiana. The work has been interrupted but little by bad weather. The area near Jennings has been surveyed and maps are now being prepared for publication.

PUBLICATIONS.

No bulletins have been issued during the past year. The report on the underground waters of North Louisiana was handed to the printer some months ago, but owing to the delay occasioned by a large number of maps that are to be issued with the publication, it has not yet come from the press. The salt report will also be ready in a short time. We therefore have now in press or ready for the press three publications that should be ready for distribution before summer.

Co-operation With the U. S. Geological Survey.

In continuation of plan inaugurated several years ago we have spent a portion of the funds of the Geological Survey for co-operative work with the National Survey. This year we spent fifteen hundred dollars in this work, and the National Department spent a similar amount in determining the exact latitude, longitude and altitude of a large number of places in Southwest Louisiana. This work will be of great service to surveyors, especially in the rice region, in building roads, drains, canals and for other purposes. It is a necessary preliminary step to any accurate work in mapping that portion of the State.

Soil Survey.

The Soil Survey of the National Department of Agriculture has continued work in co-operation with the station without cost to Louisiana. The survey of Winn Parish has been completed. The survey of Tangipahoa Parish has been completed and the publications issued. This work is of very great interest to the parishes surveyed. Copies of this publication can be secured by all interested parties by addressing the Congressman from the district.

Analyses of Fertilizers, Feed-Stuffs and Paris Green.

This work is all done now in the laboratory at Baton Rouge, under the direct supervision of Mr. J. E. Halligan. The following is a tabulated statement of the work done during the year, which for this work ended September 1, 1906:

Commercial Fertilizers.

Complete fertilizers	1,302
Fertilizers containing phosphoric acid and nitrogen, not tankages	40
Fertilizers containing phosphoric acid and potash	54
Acid phosphates	199
Bone meals	123
Tankages	372
Cotton seed meals	328
Chemicals	38
Miscellaneous	52
Total analyses	2,508

Paris Green.

There were also 73 samples of Paris green analyzed and all were found to be above the guarantee of 50 per cent arsenious acid. The average per cent of arsenious acid in these samples ran 55.13 per cent.

Commercial Feeding Stuffs.

Cotton seed meal	588
Rice bran	177
Molasses feeds	330
Corn and oat feeds	411
Wheat bran and mixed feed	74
Miscellaneous	235
Total	1,815

We also made fibre determinations on 123 special samples.

All brands of fertilizer must have stamped in plain letters and figures on the sack, the guaranteed composition, and each sack must be tagged by the Commissioner of Agriculture. The repeated inspection and anaylsis of different brands is for the purpose of seeing that the manufacturer constantly maintains his product up to the standard guaranteed. The same remarks would hold good as to feed stuffs and Paris green.

The amendment to the law passed by the last Legislature, requiring the guarantee to be given on all ground feeds not the primary products of grains, has had a good effect. Previous to this it was practically impossible to execute the law as applied to wheat bran, rice bran and so forth. The present law leaves little to be desired in the way of protection to the general public. While the law does not prohibit a man from putting a poor article on the market, it prevents him from selling it for a good article. If a purchaser is seriously imposed upon now, it is his own fault.

MISCELLANEOUS ANALYSES.

The main bulk of the fertilizer samples are received during the winter and spring months, and the feed stuff samples diminish greatly in number in summer and fall. In order to handle this business promptly during the busy season it is necessary to maintain a larger force in the chemical laboratory than would be necessary if the work was constant. This season of least activity, however, gives time to do some work for the general public, that it seems they expect us to do gratuitously. When time will permit we make analyses of waters, soil samples, suspected ores and various other products for the general public, and for this work no charge is made. As soon as the funds will permit it we expect to take up a study of the soils of the State in connection with this work.

The Adams Fund.

During the last days of May, 1906, Congress passed an act now known as the Adams Act, providing for an increased appropriation by the National Government for experiment station work. The act, however, designates that the work shall be research work, and plainly contemplates investigations of a high character, such as will throw additional light on general principles involved in animal and plant life. Much of the work carried on by this and other stations that is producing much good in the way of demonstration or the removal of minor difficulties in the way of application of known principles would not be permissible under this fund. As the national legislators make provision for more liberal support of research work, they expect the States to also become more liberal in providing for all necessary work supplemental thereto. Any diminution in funds available for dissemination of knowledge, through demonstration or otherwise, cripples the effectiveness of the research work. It is therefore to be hoped that Louisiana will keep up with the procession of progressive States in making more liberal provisions for broadening the field of work of the Experiment Stations.

This station is using the fund secured under this act in three lines of investigation. They are those of animal diseases, plant diseases, and chemical study of sugar cane and its products. The work is referred to under these heads in previous pages.

Meeting of the American Association of Agricultural Colleges and Experiment Stations.

The annual meeting of the American Association of Agricultural Colleges and Experiment Stations was held in Baton Rouge, November 14 to 16, 1906. This meeting brought to our institutions the largest number of distinguished investigators and teachers ever assembled in a Southern State. The station staff at this place were called upon to help entertain the visitors, and the response, I am sure, contributed much to the good name of this station and our people in the esteem of our visitors from nearly every State and Territory.

Experiment Station Exhibit at the State Fair, at Shreveport.

The experiment stations prepared and put on exhibition at Shreveport specimens of fruits and vegetables, forage crops, farm crops and other material secured from the three stations. Charts were prepared that graphically presented phases of the experiment station work that could not otherwise be presented. The composition of the prevailing fertilizers and feed stuffs sold in the State was shown in attractive form. Method of immunization of cattle from Texas fever, method of vaccinating for protection against black leg, anthrax and other diseases was presented in picture form, with samples of vaccines and the instruments used in the work. Temperature charts showing the reaction to tuberculin test in cattle and other work of this character was presented. Specimens of plant diseases, specimens of animal parasites and insect pests were a part also of an attractive and instructive exhibit. The exhibit was generally complimented by those who knew of its merits in a most unreserved manner. It is believed much good was accomplished by this work, in bringing the investigations of the stations before the people.

A new feature of the exhibit was a lecture room, in which lectures were delivered on farm topics. Lantern slides and moving pictures were used in illustrating these lectures. After the first few days the crowds at these lectures were as large as could be accommodated, and the enterprise was a pronounced success.

Mr. and Mrs. Robert Glenk, of the State Museum, rendered most valuable services in arranging the exhibit, and much of the success is due to their untiring work.

The following is a list of parties who constitute the present station staff:

W. R. Dodson, A. B., B. S., director, Baton Rouge, La.

R. E. Blouin, M. S., assistant director, Audubon Park, New Orleans.

J. G. Lee, B. S., assistant director, Calhoun.

S. E. McClendon, B. S., assistant director, Baton Rouge.

Fritz Zerban, Ph. D., chemist, Audubon Park, New Orleans.

H. P. Agee, B. S., chemist, Audubon Park, New Orleans.

J. A. Hall, Jr., B. S., chemist, Audubon Park New Orleans.

A. E. Dodson, farm manager, Audubon Park, New Orleans.

James K. McHugh, secretary, Audubon Park, New Orleans.

G. D. Harris, M. S., M. A., geologist, Baton Rouge.

J. E. Halligan, B. S., chemist, Baton Rouge.

H. L. Green, B. S., chemist, Baton Rouge.

J. C. Summers, B. S., chemist, Baton Rouge.

W. G. Taggart, B. S., chemist, Baton Rouge.

Roger P. Swire, B. S., treasurer, Baton Rouge.

A. P. Kerr, B. S., chemist, Baton Rouge.

Wilmon Newell, M. S., entomologist, Baton Rouge.

F. H. Burnette, horticulturist, Baton Rouge.

W. H. Dalrymple, M. R. C. V. S., veterinarian, Baton Rouge.

H. J. Milks, D. V. M., assistant veterinarian and bateriologist, Baton Rouge.

H. R. Fulton, M. S., plant pathologist, Baton Rouge.

L. O. Reid, farm manager, Baton Rouge.

T. I. Watson, farm manager, Calhoun.

E. J. Watson, horticulturist, Calhoun.

J. G. Lee, Jr., B. S., charge of feeding experiments, Calhoun.

Financial Statement.

The following is a statement of the receipts and expenditures of Stations during the year July 1, 1905, to June 30, 1906:

HATCH FUND.

As per act of Congress, approved March 2, 1887.

	Cr.	Dr.
Received from United States treasurer for the year ending June 30, 1906		$15,000.00
By salaries	$14,105.16	
Publications	887.34	
Contingent expenses	7.50	
	$15,000.00	$15,000.00

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural College for the fiscal year ending June 30, 1906, and have found the above classification to be correct, and the receipts for the time named are shown to be fifteen thousand dollars, and the corresponding disbursements are fifteen thousand dollars, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed.) CHARLES SCHULER,
Commissioner of Agriculture and Immigration.

HENRY L. FUQUA,
Vice President Board of Supervisors and Ex-Officio Member of the Board of Agriculture.

ADAMS FUND.

As per Act of Congress, approved March 16, 1906:

Received from the treasurer of the United States for the year ending June 30, 1906		$5,000.0
By salaries	$2,164.14	
Labor	476.65	
Postage and stationery	48.90	
Freight and express	12.35	
Heat, light, water and power	291.30	
Chemical supplies	54.38	
Seeds, plants and sundry supplies	80.22	
Feeding stuffs	394.66	
Library	1.10	
Tools, implements and machinery	168.79	
Scientific apparatus	387.82	
Live stock	696.00	
Traveling expenses	9.40	
Contingent expenses	7.50	
Building and repairs	206.79	
	$5,000.00	$5,000.0

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the fiscal year ending June 30, 1906, and have found the above classification to be correct, and the receipts for the time named are shown to be five thousand dollars, and the corresponding disbursements are five thousand dollars, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed.) CHARLES SCHULER,
Commissioner of Agriculture and Immigration.

HENRY FUQUA,
Vice President Board of Supervisors of the Louisiana State University and Ex-Officio Member of Board of Agriculture.

Supplementary Statement.

State appropriation		$15,000.00
Cash on hand July 1, 1905		15,612.33
Refunded, not expended, Barrow & Flynn		550.00
Farm products		3,385.33
Fertilizer fund, State Board of Agriculture		3,300.00
Miscelleanous		32.26
By salaries	$ 1,517.75	
Labor	6,007.52	
Publication	374.95	
Postage and stationery	828.48	
Freight and express	295.06	
Heat, light, water and power	1,797.42	
Chemical supplies	203.04	
Seeds, plants and sundry supplies	1,742.37	
Fertilizers	406.85	
Feeding stuffs	1,200.52	
Library	972.50	
Tools, implements and machinery	549.82	
Furniture and fixtures	1,050.88	
Scientific apparatus	310.00	
Live stock	841.36	
Traveling expenses	506.85	
Contingent expenses	1,263.01	
Miscellaneous	287.60	
Building and repairs	6,471.78	
Balance cash on hand June 30, 1906	11,252.16	
	$37,879.92	$37,879.92

The receipts and expenditures of the Fertilizer Fund, through the Commissioner of Agriculture and of the Geological Survey, are examined by the same Board as the above accounts, have been approved, have been published in the Baton Rouge Times on the first of June and the first of December, 1906, sworn to by the Director of the Experiment Station and filed with the Auditor of State Accounts.

Respectfully,
W. R. DODSON, Director.

TWENTIETH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE

FOR 1907

TO THE GOVERNOR

By W. R. DODSON, Director

BATON ROUGE:
THE DAILY STATE PUBLISHING COMPANY, STATE PRINTERS.
1908.

Louisiana State University and A. & M. College

LOUISIANA STATE BOARD OF AGRICULTURE AND IMMIGRATION

EX-OFFICIO.

GOVERNOR NEWTON C. BLANCHARD, *President.*
S. M. ROBERTSON, *Vice President of Board of Supervisors.*
CHAS. SCHULER, *Commissioner of Agriculture and Immigration.*
THOMAS D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS.

JOHN DYMOND, Belair, La.
J. SHAW JONES, Monroe, La.
FRED SEIP, Alexandria, La.
LUCIEN SONIAT, Camp Parapet, La.
C. A. TIEBOUT, Roseland, La.
C. A. CELESTIN, Houma, La.
H. C. STRINGFELLOW, Howard, La.

STATION STAFF.

W. R. DODSON, A.B., B.S., Director, Baton Rouge.
R. E. BLOUIN, M.S., Assistant Director, Audubon Park, New Orleans.
J. G. LEE, B.S., Assistant Director, Calhoun.
S. E. McCLENDON, B.S., Assistant Director, Baton Rouge.
FRITZ ZERBAN, Ph.D., Chemist, Audubon Park, New Orleans.
H. P. AGEE, B.S., Chemist and Sugar Maker, Audubon Park, New Orleans.
J K. McHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
G. D. HARRIS, M.S., M.A., Geologist, Baton Rouge.
F. L. WHITNEY, Assistant Geologist, Baton Rouge.
J. E. HALLIGAN, B.S., Chemist, Baton Rouge.
W. G. TAGGART, B.S., Assistant Chemist, Baton Rouge.
H. L. GREEN, B.S., Assistant Chemist, Baton Rouge.
A. P. KERR, B.S., Assistant Chemist, Baton Rouge.
J. C. SUMMERS, B.S., Assistant Chemist, Baton Rouge.
R. BAUS, B.S., Assistant Chemist, Baton Rouge.
W. D. MORGAN, B.S., Assistant Chemist, Baton Rouge.
ROGER P. SWIRE, Treasurer, Baton Rouge.
L. O. REID, Farm Manager, Baton Rouge.
WILMON NEWELL, M.S., Entomologist, Baton Rouge.
J. B. GARRETT, B.S., Associate Entomologist, Baton Rouge.
F. H. BURNETTE, Horticulturist, Baton Rouge.
W. H. DALRYMPLE, M.R.C.V.S., Veterinarian, Baton Rouge.
H. J. MILKS, D.V.M., Assistant Veterinarian and Bacteriologist, Baton Rouge.
C. W. EDGERTON, Ph.D., Plant Pathologist, Baton Rouge.
J. T. TANNER, Secretary and Stenographer, Baton Rouge.
IVY WATSON, Farm Manager, Calhoun.
J. G. LEE, JR., B.S., Charge of Feeding Experiments, Hammond.

Louisiana State University

AND

Agricultural and Mechanical College.

OFFICE OF STATE EXPERIMENT STATIONS.

BATON ROUGE, La., Feb. 1, 1908.

To His Excellency, Newton C. Blanchard, Governor of Louisiana.

Sir: An act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and an act of March 16, 1906, known as the Adams Act, providing appropriations for agricultural experiment stations of the several States and Territories, prescribe that each station shall make to the Governor of the State or Territory an annual report of the work done and render a statement of the financial receipts and disbursements for the government fiscal year. In compliance therewith, I submit to you a report of the work of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the year 1907, and a statement of the receipts and expenditures from July 1, 1906, to July 1, 1907, and shall send copies to the Secretary of Agriculture and the Secretary of the Treasury, Washington, D. C., as required by law.

I also submit similar reports regarding State provisions for experiment station work; for that portion of the fertilizer and feed stuffs work of the State Board of Agriculture, which is done by the experiment stations, and for the work of the Geological and Agricultural Survey. I have not included the financial statement of the last named funds. These reports are published twice annually and submitted to the State Auditor, as required by law, as a part of the permanent records of his office.

Respectfully,

W. R. DODSON, Director.

Station No. 1, Sugar Experiment Station

Audubon Park, New Orleans, La.

The work of this station has continued under the immediate charge of Mr. R. E. Blouin, who has carried the work forward with much credit to himself and the station. The following is a summary of his report for the year: The work in field, sugar house and laboratory has contributed much additional valuable information that will be serviceable to the sugar interests of the State. The winter of 1906-7 was very mild, and spring weather came unusually early, starting early crops into vigorous growth. Cold, wet weather later, followed by dry weather, neutralized much of the good effect of early growth. The season as a whole was favorable, and cane tonnage was above the average. Tonnage on plant cane was reduced by the prevalence of the Pou-a-poche (*Pseudococcus calceolariae*), which pest destroyed the germinating eyes to an extent that greatly reduced the stand. The sugar content of the cane on the station was about up to the average, being better than in many portions of the State. D 74 was again the highest in sugar content, followed by D 95, both standing higher than the home canes.

IRRIGATION.

While preparations were made several times to irrigate, rains came before drouth became excessive, and no irrigation was resorted to during the year.

FERTILIZER EXPERIMENTS.

The lines of work reported in 1906 have been continued, and additional experiments inaugurated to secure more extended information on the best combination of available materials to force the early growth and maturity of cane. Experiments in succession cane, with and without the use of leguminous crops in the stubble, and varying the source and quantity of fertilizer, have been inaugurated. A careful and systematic study of the fertilizer requirements of D 74 cane has been completed and will form a portion of a bulletin in preparation.

SEEDLING CANES.

Seedlings D 74 and D 95 have continued to show superior qualities. In some sections there has been a disposition this year to prefer D 95, but we believe the D 74 will continue to show its superiority under normal conditions.

A number of new varieties have been secured the past year, and introduced into our testing plots, bringing the total number of varieties to over three hundred.

The results from cane seed last year were much beyond our expectations and we have planted out this fall 110 new varieties of canes obtained from seed germinated in Louisiana, and this year we have now approximately 1,000 plants which we have obtained from the germination of seeds in the horticultural hall adjoining the station here. This is entirely a new feature started with some little encouragement in our attempts in 1905, augmented by those of last year, of which mention was made in our report, and considerably further advanced by our remarkable success in germinating the seed this year. In these experiments credit should be given to Mr. A. E. Weller, the horticulturist in charge of the hall at Audubon Park, who has given them very careful attention under the supervision of the station and has been untiring in his work to make this method of obtaining new varieties in Louisiana a success.

Of the varieties produced last year from the seed, a number have attained a size which indicates some possible future for them, and we hope to succeed in securing a large number this year, and from them the varieties which will be readily adaptable to our conditions here.

In the production of seedling canes (owing to their long supposed lack of fertility) it need not be expected, either now or in the immediate future, that it will be possible to grow seed on a commercial scale for the production of sugar cane in the field. In fact, the method and care necessary to successfully germinate the seed would prohibit its use for commercial purposes on any of our plantations. As is well known, cane rarely tassels with us in Louisiana, though a few tassels this year have been observed from D 74 in the lower section of the sugar belt—that is, those sections bordering the gulf, as well as in Florida and in southwest Texas. None of these tassels have so far produced any fertile seed or seed showing evidences of complete maturity, and we will have to depend upon our supply of the seed of the cane from the tropics. This year we were kindly supplied by friends in the British West Indies, the Hawaiian Islands and other tropical sugar-producing countries.

SUGAR HOUSE WORK.

The sugar house work the past year was devoted largely to experiments in clarifications and determining the amounts of clarifying agents remaining in the products, particularly with relation to sulphur and its compounds. We have also experimented with new clarifying agents, which will be mentioned in the report of the laboratory work. Differentiations were made in different runs as to the yields of the different varieties of cane, special attention being paid to the seedlings D 74 and D 95 and home canes, determining their yields and value as sugar-producing plants when grown under the same field conditions. These results will appear in bulletin form at an early date, as we are only awaiting the recovery of the final products.

LABORATORY WORK.

Under this head, investigations have been continued from the grinding season of 1906-07 and the laboratory investigations have been both of an original and practical character. The report of the laboratory work, which has been submitted by Dr. Fritz Zerban, our chief chemist, with the assistance of Messrs. H. P. Agee, J. A. Hall, Jr., and W. P. Naquin, will show the merit of the work and the scope which we have attempted to cover. The general summary of this is as follows:

The investigations begun during the grinding season of 1906-07, on the use of sulphur as a clarifying agent in the sugar house and on the elimination of the sulphur dioxide during the process of manufacture, have been continued during the past grinding season. Experimental runs were made with varying quantities of sulphur, with lime alone and with other clarifying agents, two of which have only recently been put on the markets. In addition to the regular chemical control, determinations of sulphur in its different forms were made in all products. The results of this part of the research work will soon be published in bulletin form. (See also list of publications below.)

The studies just mentioned necessitated a thorough investigation of the methods for determining sulphurous acid in sugar products. A preliminary report on this was published at the Jamestown meeting of the Association of Official Agricultural Chemists. Methods for the detection of hydrosulphites in sugar products were also tested.

Attention was also paid to the occurrence of certain metallic substances like tin and zinc, which have at varying times been used in the sugar or molasses industry and the data collected will also be published in the bulletin. (See also list of publications below.) In connection with this an investigation of the mineral constituents of the cane was carried out, paying particular attention to the detection of heavy metals like copper, tin, lead and zinc.

A large part of the time was taken up by complete sets of analyses of the products which were used in the experiments on the influence upon the human system of Louisiana syrups and molasses.

A considerable amount of work has again been done in cooperation with the Association of Official Agricultural Chemists. The use of different clarifying agents in the determination of the different sugars, and methods for the elimination of reducing sugars were studied and the results are embodied in the report of the referee on sugar, submitted at the Jamestown meeting, October 9-12, 1907.

The study of the effects of the different fertilizing ingredients on the composition of cane has been completed.

An investigation on certain non-sugars of the cane, especially on the organic acids and on the different organic combinations of sulphur in cane and cane products has been begun and will be continued during the coming year.

The very interesting case of a Cuban raw sugar which gave a smaller yield of refined sugar than expected was also investigated. (See list of publications.)

In addition to these scientific researches, which necessitated several thousand analytical determinations, considerable work was done in connection with the field work, and 154 analyses of different samples from outside sources were made.

The following publications have been issued during the past year:

Sulphur in the Process of Sugar Manufacture. By Fritz Zerban, Ph.D. Read before the Louisiana section of the American Chemical Society, Feb. 15, 1907. The Sugar Planters' Journal, Vol. 37, 314.

Clarification of Cane Juices in Louisiana. By Fritz Zerban, Ph.D. Read before the Louisiana Sugar Planters' Association, March 14, 1907. The Louisiana Planter, Vol. 38, 171.

Determination of Sulphites; Tin and Zinc in Molasses. By Fritz Zerban, Ph.D. Read before the Louisiana section of the American Chemical Society, March 22, 1907.

Preliminary Investigation on the Composition of a Cuban Raw Sugar. By Fritz Zerban, Ph.D. The Louisiana Planter, Vol. 39, 2.

On the Determination of Sulphurous Acid in Molasses. By Fritz Zerban, Ph.D., and W. P. Naquin, B.S. Read before the Jamestown meeting of the Association of Official Agricultural Chemists, October 9-12, 1907.

Studies on the Sulphur Control in the Sugar House. By Fritz Zerban, Ph.D. The Louisiana Planter, Vol. 39, 388.

CANE LOADERS.

It will be remembered that during 1905-06, the station gave special attention to securing demonstration tests of cane loaders. At these trials a great majority of the inventors exhibited the work of their machines, and the planters attended in very large numbers from every sugar-producing parish in the State to determine from their own observation the relative character, make and efficiency of the different machines for loading sugar cane from the field to the cart or wagon. Practically all of the inventors placed large numbers of their machines and a large portion of the crop the past season was loaded on the cane carts by machines, thus alleviating to a considerable extent the labor conditions existing on our plantations.

CANE HARVESTERS.

The station has offered every facility for the continued testing of cane harvesters by the different patentees who have built machines, and this year we have had four machines tried at the station. It is gratifying to note that all of them show marked improvements. The inventors are very hopeful of the completion of a machine in a short time that will harvest canes in Louisiana that remain erect. All of the harvester inventors seem to give marked preference to the D 74 cane, closely followed by the D 95. Whereas, home canes, when erect, have been handled with equally as great facility as either of these two varieties, none of them so far have extended their investigations as to the handling of those canes which are more or less prostrated in our fields—a common occurrence, that is, where home canes are grown.

IMPROVED IMPLEMENTS.

Quite a number of improved agricultural implements have been tried at the station this year, and our entire force has discussed with the various manufacturers their merits and consulted with them as to alterations increasing their efficiency or remedying defects of the implements tried. The proposition of the steam plow has again come to us from several sources, and the chances are extremely bright in the near future of having several manufacturers making experiments as to the adaptability of these implements in the breaking and bedding of our alluvial lands in Louisiana. Several have promised implements for this purpose this year, as well as others with modifications, as to the drafting power, from steam to gasoline, and we feel extremely interested in the ultimate outcome of this marked advent in both the rapidity and the thoroughness of our preparations of soils and other usages to which this motive power can be applied on sugar plantations. The station has extended to all manufacturers, inventors and agents a cordial invitation to test their implements here and every courtesy and assistance that is possible to render will be given to them. Visitors to the station are always welcome to witness any operations that are performed here.

CORN AND COTTON.

Cotton has been tested here as usual with standard varieties, and a number of new tests introduced. The corn and cotton crops at the sugar station were both up to the average. The yields for a series of years, of the varieties tried, are being tabulated for publication.

Mr. Hadley, of Cincinnati, inventor of the corn shucker and many other improved agricultural machines, has spent considerable time at the station, perfecting his corn shucker. He also has a cane harvester in course of construction and development at the station.

FORAGE CROPS.

In addition to continuing experiments with a great number of varieties of these crops, new varieties have been introduced through the United States Department of Agriculture and experiments conducted in co-operation with this department on alfalfa, clovers, soy beans, cow peans, phaseolus, vetches, etc., and some of these varieties are showing prominence here with us. A new bean, known as the Sword bean, proved a remarkable growth with us this year. It has not proven to be a good plant for feeding purposes, but is excellent as a soil renovator.

FIBER CROPS.

Our experiments with these have been continued, maintaining small plots of ramie, jute and hemp, and introducing new varieties of these. The character of growth and quality proved very satisfactory this year, but all of these crops are anxiously awaiting the development of a practical decorticator, which as yet has not been developed in this section.

OLIVE ORCHARD.

The olive orchard still maintains its vigorous and healthy growth, though no fruit has been produced this year. We are hopeful, however, of eventually obtaining some results from these, as some of the trees have attained a magnificent size and show every indication of vigorous and healthy growth.

CITRUS FRUITS.

Experiments with these have been continued along the line of variety tests only as to growth, and whereas our crop this year was very small, the evidences show that some of the varieties have been more resistant to the attacks of scale insects and the white fly than others. Methods of spraying for the extermination of this scale and the white fly were tried in co-operation with the Crop Pest Commission, as mentioned in our report of last year, and the results show no positive method of exterminating these pests completely by spraying, our location being infected from all places with any quantity of scale insects and white flies renders us comparatively hopeless as to the complete eradication here unless similar methods are carried on throughout this section. The Crop Pest Commission is vigorously at work on them and it is hoped that in the near future some marked advance will be made along this line.

MISCELLANEOUS.

We have also conducted experiments here, with the aid of the Crop Pest Commission, as to the habits and character of an ant which has proven a great pest to our agricultural, floricultural and domestic conditions. This is now a serious problem and with its rapid spread, as is particularly noted in reports from the Crop Pest Commision, we are led to look forward to rather alarming consequences from this industrious and indefatigable insect. With the assistance of Prof. J. B. Garrett, assistant entomologist of the station, investigations have been carried on as to the character and habits and methods of attack of the *Pseudococcus calceolariae,* or the Pou-a-poche, commonly called by us "mealy bug."

Again the station has been actively engaged in aiding to protect the sugar interests of the State against arbitrary rulings in regard to the National Pure Food Law. The assistant director has made several trips to Washington and New York this year as one of the representatives of the sugar interests in our State, presenting positively our findings and investigations, as well as the conditions existing in Louisiana, to those in charge of the formulation of rules, etc., under this law. In these hearings we have suceeded in securing an immunity from the action of the law for the crop just grown, and, as far as we know at present, for the crop now growing. The use of sulphur is not prohibited in the clarifying of juices, if used as we have ordinarily used it in Louisiana, and along this line an extensive and elaborate experiment was conducted in co-operation with the State Board of Health on subjects as to the value of Louisiana syrups and molasses on the human system, published as Bulletin No. 91.

The conducting of these experiments and the co-operation of the sugar interests in this State has greatly encouraged us in this work and has materially assisted us in maintaining the high standard of the products manufactured in Louisiana from sugar cane.

CHANGES IN STAFF.

Since our last report, Mr. Allen E. Dodson has resigned as farm manager, and he was succeeded by Mr. J. A. Hall, Jr., as chemist and farm manager. Mr. Hall recently resigned, and his succesor is Mr. A. Scheer, who is now occupying this position. Mr. W. P. Naquin, a graduate of the Audubon Sugar School, has suceeded Mr. Hall as assistant chemist, and Mr. P. H. Doherty, also a graduate of the Audubon Sugar School, has been installed as an assistant chemist.

AUDUBON SUGAR SCHOOL.

The demand for graduates of the Audubon Sugar School of the Louisiana State University and Agricultural and Mechanical College this year has been markedly in excess of the supply, and a number of the seniors of this school have taken positions on several of our sugar plantations during the last grinding season. The demand from the tropics still continues great, and our graduates are eagerly sought after. It is still the policy of this division of the University to continue in requiring their junior and senior students to take a practical course of instruction in the agriculture, chemistry and manufacture of sugar at the station here, and our class this year was a marked increase over recent sessions.

Station No. 2, State Experiment Station

Baton Rouge, La.

The office of the Director and headquarters for all the stations are maintained at the Experiment Station building, on the University Campus at Baton Rouge. All the bulletins are issued from this station. The analyses of fertilizers and feed stuffs are made here. The work of this station is more comprehensive than that at either of the other stations, as will be seen by the reports of the various departments.

FARM DEPARTMENT.

The work at the Station farm has continued under the management of Mr. S. E. McClendon, Assistant Director, who has faithfully and energetically discharged his duties. Our studies have covered a great diversity of topics, the most important ones are as follows:

CATTLE FEEDING.

We have continued our experiments in cattle feeding, mostly with satisfactory results. We have not yet completely exterminated the intestinal parasites of cattle, disastrous results of which have been discussed in a previous report, though we thought at one time that this pest had been brought under control. We have sold from the station, during the year, a number of high-grade cattle that we believe would have topped the market in Northern cities, but we did not have sufficient number to justify shipment. These animals were born and raised on the station, and we believe were superior to the steers shipped by us to Chicago three years ago, "topping the market" at that time, at $5.65 per hundred pounds.

The best results in feeding have been secured by feeding cotton seed meal and hay and silage.

The results from increased fertility of land on which cattle ranged while fed have been very striking. Data on this subject will be secured for a number of years before publishing.

GRAZING EXPERIMENTS.

Efforts to determine more accurately the value of grazing crops have been continued. Results have again shown fall sown oats to give the best results for winter grazing for hogs and sheep. Records of these experiments will be published when all results have been sufficiently verified by repetition.

STOCK BREEDING.

We are constantly improving our herds of Angus and Hereford cattle, by retaining the best individuals for breeding purposes. The fine calves secured just previous to the last annual report survived the immunization fever, and passed the summer successfully, and are now beautiful animals, growing rapidly.

SHEEP.

A herd of sheep are now on our pasture. Our purpose is to give a demonstration of ''breeding up'' a good herd, and also to put under practical test the method of combatting the stomachal and intestinal worms, that are commonly destructive to sheep. Another feature of this experiment is to get the data on the practicability of producing early lambs for market.

HOGS.

Hogs are raised at the station, partly as a demonstration, partly to furnish good animals with which to carry on feeding experiments, and to help to supply the demand for improved blood.

SILO.

The silo was filled with a variety of crops, including sorghum, corn, pea vines and cane tops. Cane tops proved inferior to corn as silage, but were kept in perfect condition and made excellent feed. Chemical analyses and results of feeding will be given in bulletin form.

IMPROVED IMPLEMENTS.

Improved implements for handling hay and grain crops were added to our equipment the past year. A hay loader which gathers the hay from the ground and loads it onto the wagon has proven entirely adaptable to our conditions. We now have all the most modern implements for handling hay and grain crops, and have comparatively little trouble in securing labor to sucessfully operate all of them.

FORAGE AND ROOT CROPS.

In addition to the forage crops previously grown, we have introduced a number of new varieties that are promising, the most promising new grass being a South American species secured through the United States Department of Agriculture and called ''Guinea grass.'' Some of the large collections of soy beans previously reported have been perpetuated, the most promising varieties being selected. A species of Egyptian clover, also secured through co-operation with the National Department of Agriculture, has promise of being a valuable addition to our forage crops. A new strain of Arabian alfalfa, secured through the same source, seems earlier and more thrifty, but less resistant to freeze than any ordinary alfalfa.

Miscellaneous forage crops have been grown as usual. We have devoted more than ordinary attention to root crops. One variety of stock beets produced the enormous yield of 60 tons per acre. These crops should be more extensively cultivated by small farmers and dairymen.

An important discovery regarding the failure of sorghum to mature seed was made the past season. Some experiments were carried on in co-operation with Mr. Carlton R. Ball of the United States Department of Agriculture, in which it was fully demonstrated that the failure to mature seed was due to the fact that a minute fly deposits its eggs in the young sorghum seed, thus preventing its maturity. Efforts will now be directed toward controlling the insect.

OATS.

We grew about 30 varieties of oats the past season, the home-grown seed proving, as usual, superior to all others. The season was unfavorable to the oat crop throughout the State, owing to excessive rains at harvest time.

JAPANESE CANE SYRUP.

Stimulated by reports from Texas and Florida of excellent results secured from Japanese cane made into syrup, many farmers have inquired regarding the possibility of profitable syrup making from this plant in Louisiana, especially in the hills, where the boll weevils have reduced the production of cotton—this cane doing much better on the poor lands than the Louisiana cane. To secure additional information on this subject, though the cane has been grown for years, sufficient cane was taken from the station at Baton Rouge to make a run on a small syrup mill near by. The syrup was much inferior in flavor to that from Louisiana cane. In fact, we do not believe that this syrup could be sold in competition with syrup from Louisiana cane.

Department of Animal Pathology.

This department has continued under Dr. W. H. Dalrymple and Dr. H. J. Milks.

The following is a synopsis of the work reported on by Dr. Dalrymple:

During the year the Veterinary Department conducted some interesting experiments in connection with stomachal and intestinal parasites of sheep. The objects aimed at were, first, to test the bare-lot as against the grass-lot method of raising lambs to see the difference, if any, in the results obtained, so far as infestation of the lambs with parasites was concerned.

Second, to test the effect of different medicinal agents on lambs under both bare-lot and grass-lot conditions.

Control, or check, animals were employed in each division of the experiment. The results obtained were very satisfactory, and they have been published as Experiment Station Bulletin No. 95.

It might be stated that as soon as this bulletin was published it was reproduced, in full, including illustrations, in The American Sheep Breeder, the most influential journal devoted to sheep husbandry in America. It was also published in full in two British veterinary periodicals; besides, excerpts from it have appeared in quite a number of the agricultural and live stock publications throughout this country.

The Department, besides attending to veterinary matters connected with the Experiment Station, looks after the correspondence concerning animal husbandry, feeding, etc. The increasing desire on the part of our farmers and planters to go more and more into live stock has occasioned a very considerable increase in this class of correspondence. And the question of economic feeding of animals has become one of such immense importance to our stock owners, that the inquiries by letter, and otherwise, with regard to the virtues of different classes of feed stuffs and the balancing of rations, etc., have become extremely numerous, and are steadily on the increase. It may be fair to state that through the influence of this department of the Experiment Station, the cost of feeding on the sugar estates of the State alone has been reduced at least 30 per cent, which represents a considerable amount of money in the aggregate.

The purely veterinary correspondence has been quite extensive, and has covered questions of all kinds relating to almost every disease that animal flesh is heir to.

During the year Dr. Dalrymple represented the University and Experiment Station on several occasions. In the early part of May he attended the Second Annual Conference of Health Officers, under the auspices of the Louisiana State Board of Health, at Opelousas, and presented a paper on "The Importance of Meat and Dairy Inspection," besides taking part in a number of the discussions on general sanitary topics. In the end of May he attended the Semi-Centennial Celebration of the Michigan Agricultural College, the meeting of the Association of American Agricultural Colleges and Experiment Stations, and the meeting of the Association of Farmers' Institute Workers of America, at Lansing, Mich. In September he was in attendance at the 44th Annual Meeting of the American Veterinary Medical Association, at Kansas City, Mo., and had the honor of being elected President of that continental organization.

Dr. Dalrymple also contributed a number of articles to different journals, both agricultural and veterinary, at home and abroad. Chief among these were articles bearing upon the value of sugar cane molasses (blackstrap) as a feed for stock, and an article on "The Diagnostic Symptoms of Anthrax in Horses," contributed to a foreign veterinary periodical. Several of these articles have been reproduced in other journals.

It should be stated, perhaps, that, on account of Dr. Dalrymple's official connection with the Experiment Station, the latter receives its full share of the credit for this work.

Dr. Dalrymple being a member of the faculty of the Louisiana State University, a large part of his time is occupied in class work during the college term. Notwithstanding this, however, as much of his time as he has at command is devoted to the veterinary and animal husbandry work of the station, and the large amount of correspondence which he receives, both in connection with animal diseases and animal husbandry, is attended to with as much despatch as possible.

The following is a synopsis of the report of Dr. Milks on the diseases of animals that have been studied the past year.

ANTHRAX OR CHARBON.

Since no outbreaks of this disease have been reported in time for investigation in the field, the work has been carried on at the laboratory. The various vaccines have been tested upon small animals and sheep. An experiment in which twenty sheep were used was made with three differnt vaccines.

An experiment is now under way to immunize some sheep against large doses of virulent anthrax bacteria. The aim in this experiment is to produce a serum with antitoxic properties and to verify Sobernheim's method of vaccination. This method is known as the simultaneous, and the vaccine as *Sero-vaccine*, Merck.

Since no field work was done, it was impossible to study the role that flies play as carriers of the disease. An experiment was undertaken along this line, but had to be abandoned because it was impossible to keep the flies in captivity.

Several attempts have been made to produce the disease in chickens, but so far we have been unsuccessful. More work will be carried on with these animals and similar experiments will be made with fish.

CEREBRO-SPINAL MENINGITIS.

This very fatal disease of horses and mules has been very prevalent during the past summer. Several localities were visited and much time given to investigations as to cause, treatment, prevention and pathology of the disease. The results of these investigations will soon be ready for publication.

DISEASES OF CHICKENS.

A disease very fatal to young chickens has been studied and found due to an organism so far undescribed. This organism has been isolated and its characteristics determined.

Several other diseases of chickens have been studied, but insufficient data has been obtained to arrive at any conclusions.

The department has been frequently called on to make bacteriological diagnosis, especially in the cases of suspected anthrax or tuberculosis.

Department of Plant Pathology.

This department has been under the direction of Mr. H. R. Fulton. He renders the following synopsis of work done:

COTTON.

Wilt or Blackheart Disease.—A general account of this disease has been published as Bulletin No. 96 of the station, under the title of "Cotton Wilt." Tests made in different sections of the State with Jackson Wilt Resistant and with Dixie Wilt Resistant cotton, which are the two least susceptible varieties known, have indicated that these are not suited for use in boll weevil districts, and have emphasized the importance of the breeding work already begun, which has for its object the securing of a variety that is early and wilt resistant and otherwise desirable. This work is being carried on along the lines of cross-breeding and selection, and it is believed that satisfactory progress is being made.

Anthracnose.—This disease of the boll of cotton has been unusually prevalent and detructive during the past year. While the cause and nature of the disease are very well known, no successful methods for control have been worked out. The loss from this disease every year is considerable in the aggregate, and the matter of proper control is an important one. A circular giving a concise account of cotton anthracnose, and suggestions for possible control, was prepared and sent to the large number of persons who asked for information about the trouble.

SUGAR CANE.

Root Disease.—This seems to be the only largely destructive disease of sugar cane occuring in the State. Several minor troubles have been noted, and are under observation, but their economic importance is not such as to warant extensive investigation at this time. A rather full preliminary account of the root disease has been prepared, and will soon appear as Bulletin No. 100. Much of the work along the several lines of this investigation must be continued for a period of years before accurate conclusions can be reached; and new lines will suggest themselves during the progress of the work.

The present publication, while not final, will, it is hoped, serve a useful purpose in giving some accounts of the disease and suggestions regarding proper means of control.

RICE.

Blast.—This is the most destructive disease of rice found in the State. It effects the heads, preventing their proper filling out, so that yields are light from fields that may have been promising up to and after the time of heading out. The fungus may also attack very young plants, causing their death.

Brown Spot of Grains.—This trouble occasions heavy grading down of rice when any considerable portions of the grains are affected. The injury is brought about by the growth within the grains of saprophytic fungi and bacteria of several species; these are introduced by the punctures of a brown diamond-back pentatomid bug. While the problem of prevention of loss from this source is a problem for the entomologist rather than the botanist, it has seemed advisable to prepare some acount of the nature of the trouble.

Green Smut and Black Smut.—These two diseases have been about as prevalent as last year. The loss occasioned by them is at present rather inconsiderate. A bulletin is being prepared on the diseases of rice, which will give the results of the investigations that have been carried on.

GARDEN AND TRUCK CROPS.

Detailed work on the diseases of this very large group of plants has been confined to some of the diseases of pepper and of beans. One of these, the fungus blight or wilt of pepper, also affects beans, tomatoes, Irish potatoes, cow peas, cabbage, fig, cotton and a wide range of other valuable plants. Of the bean disease, the two most destructive are pod spot or anthracnose, and bacterial blight or bacteriosis. Both of these occur to a considerable extent in the State. Two less well-known diseases of beans, the fungus blight and a rot of pods and stems caused by the fungus *Rhizoctonia,* have also been studied. An acount of all of these diseases, with information regarding their control, will be issued as a bulletin of the station, No. 101.

GENERAL.

The usual number of inquiries regarding a wide range of diseases of plants have been received and the desired information given whenever knowledge of the diseases permitted.

Horticultural Department.

The work of this department has continued under Prof. F. H. Burnette. The following is a brief synopsis of what has been done.

The work in the horticultural department has been continued along general lines. The fertilizer experimental work with sweet potatoes has been completed and the results will be published in due time.

Cabbages and cauliflowers have also been grown, both in varietal list and commercial list. Tomato experiments have also been conducted and will be completed during the coming year.

The oranges and citranges have received attention, all the available varieties of the latter are being secured as rapidly as posible, from the United States Department of Agriculture. There is no doubt but that some of these will prove very desirable.

The propagation of pecans has been carried on and continued work along pecan lines is being planned.

A bulletin upon the Japanese Persimmon, No. 99, has been issued and one upon figs is in preparation.

Some attention has been given to the planning and planting of school grounds, and a limited quantity of plants for decorative purposes has been distributed.

The Louisiana State Horticultural Society, of which Mr. Burnette is Secretary, has received some attention and an earnest effort is being made by the department to build up a society that will stimulate an interest in the horticultural development of the State.

There has been a large increase in the correspondence of the department during the year, and the station has been honored in having Mr. Burnette elected again to the Presidency of the National Nut Growers' Association, an organization which includes all of the nut-growing States, and is actively encouraging the planting of pecans in the Southern States as one means of increased diversification.

He is also the representative from Louisiana in the American Pomological Society. This organization has a membership of many hundreds and is also national in its scope.

RICE EXPERIMENTS AT CROWLEY, LA.

In co-operation with the United States Department of Agriculture and some of the citizens at Crowley, La., work has been continued in testing varieties and fertilizer requirements of rice, this being the second year of this work. I am glad to report much more gratifying results than were obtained the year previous. Something over three hundred varieties were cultivated the past season, and something over sixty fertilizer experiments were tried. There is urgent need for enlarging this work, and there is considerable demand for the establishment of a permanent rice experiment station. At the present time we are using land gratuitously offered by Mr. J. F. Shoemaker, and irrigation water furnished free of charge by Duson Brothers. This work should be established on land belonging to the State, and every facility furnished to conduct the work with convenience and accuracy. Grounds, buildings and facilities should be furnished not only for rice experiments, but for studying all the problems that pertain to the permanent welfare and prosperity of the rice section.

DAIRY WORK AT HAMMOND, LA.

Early in 1907 the Dairy Division of the Bureau of Animal Industry of the United States Department of Agriculture offered to send a man to Hammond, La., to make investigations along dairy lines that seemed urgent, if we could co-operate with them and meet part of the expenses. I made a personal visit to Hammond, met there a representative of the National Department, and several prominent men interested in the dairy business, and arranged for securing records of feed consumption and milk production, and analyses of milk from a number of herds, and for some feeding experiments, both for suckling calves and milk-producing cows. It was later necessary to send a man to represent the station in this work, and J. G. Lee, Jr., was detailed to fill the position, while Mr. T. E. Woodward represented the United States Department. These young men have shown great interest in their work. We have a bulletin now in press giving results of herd tests. Another bulletin on feeding young calves is about ready for publication. The feeding experiments with varied rations has been delayed, and is just now being inaugurated. It is hoped that this work will stimulate greater progress in up-to-date methods of dairy practice in that vicinity, which supports the largest dairy business in the State outside of New Orleans.

TICK ERADICATION WORK.

The Station has always taken an active part in the tick eradication work, this Station having been the first to work out the complete life history of the tick and determine the time required to eradicate the tick under a rotation system. Toward the close of the year, when the National authorities found it necessary to reduce the expenditures for tick eradication work in the northern portion of Louisiana, at a time when it seemed necessary to further guard the territory already cleared of ticks, to make the work effective, the Crop Pest Commission could not supply any additional men for this purpose. The Experiment Station employed to meet the deficiency additional men. This is demonstration work, rather than experimental work, but the Experiment Station Committee thought this action was entirely proper under the circumstances.

STATE FAIR.

The Experiment Stations again made a fine exhibit at the State Fair at Shreveport. The exhibit space was the same as last year, and to those interested in agriculture it was the most attractive portion of the agricultural building. Our exhibit was probably the most instructive one that we have yet made.

The State University also had a most creditable display along with that of the Experiment Stations.

EXTENSION WORK.

No farmers' institutes were held during the past year, but the Director of the Stations has made about seventy addresses and lectures on agricultural topics to gatherings of farmers, school teachers and public schools. Other members of the staff have given consideration in the way of a number of lectures to similar bodies.

Station No. 3, North Louisiana Experiment Station,

Calhoun, La.

This Station is located in Ouachita Parish, and is under the immediate direction of Major J. G. Lee. At the rendering of the last annual report, Major Lee was on leave of absence on account of poor health. Mr. J. B. Garrett, a graduate of this University, was placed in charge of the station during the absence of Major Lee, and he carried the work forward in a most creditable manner. November, 1907, Mr. Lee returned, having sufficiently regained his health to resume the work, and at the present time the work is progressing nicely under his active management.

FERTILIZER EXPERIMENTS.

These experiments on corn and cotton have been continued without modification. A series of experiments with phosphoric acid on new ground were conducted the past year for the first time, resulting in considerably increased yields. A series of experiments on the spring application of fertilizers to oats were also inaugurated. The results this year show that the crop can be more than doubled in yield by moderate fertilization with readily available fertilizers, just as vigorous spring growth sets in.

Experiments to determine the influence and quality of syrup from fertilizers applied to cane, have been continued, this being the second year. Cotton seed meal and acid phosphate again showed superiority over stable manure. Applications of stable manure produce a dark colored syrup with rather an unpleasant flavor, which we have not yet been able to neutralize.

Experiments in the Williamson method of cultivating and fertilizing corn were begun the past year. The results were largely vitiated by severe damage to the crop by storms and excessive rains.

329506

FEEDING EXPERIMENTS.

Reported last year as having been inaugurated, terminated very successfully so far as the actual gain in weight of the steers was concerned, but we were not able to secure the premium in the price of the fat steers that we were entitled to. Some of the consumers of the meat reported it as being of exceptionally good quality. The butchers state that if they could secure enough of this quality of beef to supply a constant trade, they would be justified in paying better prices for it. We are again feeding fourteen steers, one group on cotton seed meal and hulls, and one on silage and cotton seed meal. The largest and cheapest gains are being secured from feeding silage.

THE SILO.

This is the second year we have used the silo for preserving succulent feed stuff, and the results have been highly successful. Some of the friends of the Station who are well acquainted with the work done in preserving and feeding silage regard this as the most valuable work done by the Station for some time.

PRESERVATION OF FARM TIMBERS.

At the present time, we are just beginning some very important experiments, in co-operation with the Forestry Service of the National Government, in the preservation of fence posts. The supply of durable rough timber for service in contact with the soil or exposed to the weather is rapidly becoming depleted. It is believed that a cheap and practical method of impregnating sap woods with creosote has been discovered that will enable us to use timbers now considered valueless, and make durable fence posts, shingles, etc., out of them. If these experiments are a success, it will mean a market for the small pine of the old fields, for sweet gum, black gum, bay and other woods that now have no value, but are quite abundant. These experiments will be carried on at Calhoun.

DISTRICT FAIR.

The fair held on the Station grounds the past year was universally conceded to have been the best fair yet held. In agricultural displays, it was far superior to the State Fair at Shreveport.

FARM MEETING.

The interest in the monthly meetings has kept up, the attendance being excellent at most of the meetings. A great deal of good is accomplished through these discussions.

HORTICULTURAL AND TRUCK WORK.

Work along these lines has been continued, mainly in continuation of experiments already reported.

A new orchard for seedling peaches and scuppernong grapes was cleared and planted, and a collection of native plums begun. It is our purpose to gather at the Station all the native grapes, plums and seedling peaches as a basis for breeding work.

I regret to report that we have lost the services of Mr. E. J. Watson, who has been with the station since its organization. His long and faithful service made him a most valuable man. He resigned to go into commercial work.

A report of the work of the year would be incomplete without reference to the faithful service of Mr. T. I. Watson, for many years farm manager, who ably looked after all interests of the Station during the three months interim between the departure of Major Lee on leave of absence and the arrival of Mr. Garrett, as acting assistant director. Mr. Watson's familiarity with the details of the work at the Station, from his long and efficient service, enabled him to keep the work in good form.

NEW BUILDINGS.

Some improvements have been made to the buildings, and a residence of the farm manager is now being constructed on the grounds.

BUILDING BURNED.

Early in December, 1907, the small building used as a butter room was burned. It was insured for $200.00.

Analyses of Fertilizers, Feed Stuffs And Paris Green.

Mr. J. E. Halligan is the head chemist in charge of this work. In response to my request he has tabulated the following statement of the work done in this laboratory for the year ending September 1st, 1907:

General Summary—	1905-06.	1906-07.
Fertilizer analyses made	1,075	1,160
Feed stuff analyses made	643	1,581
Paris green analyses made	73	214

Commercial Fertilizers—	1905-06.	1906-07.
Complete fertilizers	1,302	2,164
Fertilizers containing phosphoric acid and nitrogen, not tankages	40	67
Fertilizers containing phosphoric acid and potash	54	95
Acid phosphates	199	486
Bone meals	123	206
Tankages	372	206
Cotton seed meals	328	864
Chemicals	38	58
Miscellaneous	52	15
Total analyses	2,508	4,161

The results of the fertilizer work show that there was an increase in the number of shipments for the past year. The manufacturers are endeavoring to "sell what they state," but the analyses show the importance and necessity for our law.

PARIS GREEN.

There were 214 samples of Paris green examined and all of them ran above the guarantee of 50 per cent arsenious oxide as required by our law. The average per cent of arsenious oxide in the samples was 57.17.

Commercial Feeding Stuffs—	1905-06.	1906-07.
Cotton seed meal	588	749
Rice bran	177	343
Rice polish	....	142
Wheat products	74	1,402
Molasses feeds	330	442
Corn chops	....	2,101
Corn and oat feeds	543	749
Hominy feeds	....	42
Feed meals	....	65
Brewers' grains	29	46
Poultry feeds	4	323
Miscellaneous	70	65
Total analyses	1,815	6,469

The amendment to the Feed Stuff Law requiring the manufacturer to guarantee and tag all ground products not the primary products of grain, is the cause of the increase of the many samples in the above table under the headings, Rice Polish, Wheat Products, Corn Chops, Hominy Feeds, Feed Meals and Poultry Feeds.

The enforcement of the Feed Stuff Law has resulted in not only requiring the manufacturers to reach their guarantee, but it has also brought about a great improvement in the composition of several of the feeds offered for sale in this State. Louisiana is no more used as a dumping ground for inferior feeds. Manufacturers find that it pays them to put out a high-class feed. Last year, one company changed the guarantee on one of its brands three times, each time making it better.

MISCELLANEOUS ANALYSES.

Several samples of feed stuffs, fertilizers and waters were sent in by planters during the past season. Samples of soil, ores and other miscellaneous materials were also examined. The official work is always given preference and any material that is sent in is analyzed during our spare moments free of charge.

By comparing the work done along the lines of fertilizer and feed stuffs control with other State laboratories, we find that our laboratory made 90 analyses more per man than any other laboratory of which we have reports. In the number of feed stuff analyses made we surpassed all of the laboratories charged with such work. It is our aim to get the results to the planter and manufacturer at the earliest possible moment, after the samples reach us.

The work of the laboratory has the confidence of the planters and the manufacturers and contracts for payment are frequently made on the results of our work.

The equipment of the laboratory has been improved by the installation of new apparatus which greatly facilitates the work.

The laboratory force has done some work for the Association of Official Agricultural Chemists. Messrs. Halligan, Green, Taggart and Summers co-operated on the determination of nitrogen and water, and Mr. Halligan was appointed associate referee on sugar and referee on molasses.

State Geological Survey.

The following synopsis of work done and planned is submitted by Dr. G. D. Harris, Geologist, who has continued in charge of the work.

CO-OPERATIVE WORK.

Co-operative work of this survey with the U. S. Geological Survey ended during the few first days of January, 1907. Since that date the latter organization has continued independently in and about Winn Parish, making a complete precise traverse of the parish and a road map of the same. The soil survey has platted the soils for the same area.

The Coast and Geodetic Survey has continued to maintain tide-gage work at Weeks' Island at the station established by the State Survey.

STATE WORK.

Finished editing and putting through the press Bulletin No. 4, Veatch's Underground Water Resources of Louisiana.

Had maps engraved, wrote, edited and published Bulletin No. 5, Notes on the Geology of the Winnfield Sheet; had maps engraved, wrote, edited and published Bulletin No. 6, Cartography of Southwest Louisiana; completed work on Salt, Bulletin No. 7; had maps engraved, printed, and text manuscript in the hands of printer. Spent latter part of November and December, 1907, in geological work for forthcoming report on oil in Louisiana.

The following work is planned for 1908-09:

I. Season of 1908-09, final study of oil fields and publishing of report. II. Field work and report on the clays of the State. III. This is completion of work and report upon the Lignites of the State. IV. Co-operation, if funds will permit, with the U. S. Geological Survey, to the extent of making one or two quadrangles annually as outlined on Pl. X, Bulletin No. 6. The interesting and important area about Shreveport should be mapped in co-operation with U. S. Geological Survey. Good base maps mean free soil surveys.

Financial Statement.

The following is a statement of the receipts and expenditures of the Hatch Fund and Adams Fund for the year ending June 30th, 1907:

DR.

		Hatch Fund.	Adams Fund.
To receipts from the Treasurer of the United States, as per appropriations for fiscal year ended June 30th, 1907, under acts of Congress, approved March 2, 1887 (Hatch Fund), and March 16, 1906 (Adams Fund)		$15,000.00	$7,000.00

CR.

	Abstract.		
By Salaries	1	$14,296.32	$5,310.17
Labor	2	20.00	36.50
Publications	3	683.68	....
Postage and stationery	4	......	1.70
Freight and express	5	......	41.81
Heat, light, water and power	6	......	282.36
Chemical supplies	7	......	203.74
Seeds, plants and sundry supplies	8	......	25.90

Seattle Public Library

Feeding stuffs	10	......	8.65
Library	11	......	151.74
Tools, implements and machinery	12	......	.40
Furniture and fixtures	13	......	.30
Scientific apparatus	14	......	476.96
Live stock	15	......	37.92
Traveling expenses	16	......	123,35
Buildings and land	18	......	308.50
Balance		......	....
Total		$15,000.00	$7,000.00

W. R. DODSON,
Director Experiment Station.

Financial statements of the receipts and expenditures for geological survey fund, fertilizer, feed stuff and Paris green fund, and State fund for experiment stations, is published semi-annually and filed with the State Auditor.

We, the undersigned members of the Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the fiscal year ending June 30th, 1907, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000 for the Hatch Fund, and $7,000 for the Adams Fund, and the corresponding disbursements are $15,000 for the Hatch Fund and $7,000 for the Adams Fund, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed)

CHAS. SCHULER,
Commissioner of Agriculture and Immigration.

HENRY FUQUA,
Vice President Board of Supervisors of the L. S. U. and Ex-Officio Member of Board of Agriculture.

TWENTY-FIRST

ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

FOR 1908

TO THE GOVERNOR

BY

W. R. DODSON, Director.

BATON ROUGE:
The New Advocate, Official Journal of the State of Louisiana
1909

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR JARED Y. SANDERS, *President.*
HENRY L. FUQUA, *Vice President of Board of Supervisors.*
CHAS. SCHULER, *Commissioner of Agriculture and Immigration.*
THOMAS D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS.

R. S. Moore, Plaquemines.
Henry Gerac, Lafayette.
John T. Cole, Monroe.
John J. Henderson, Lagan.
J. E. Bullard, Belmont.
R. E. Thompson, Wilson.
Jeff D. Marks, Crowley.

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
HAMILTON P. AGEE, B. S., Assistant Director, Audubon Park, New Orleans.
J. B. GARRETT, B. S., Assistant Director, Calhoun.
S. E. McCLENDON, B. S., Assistant Director, Baton Rouge.
P. A. YODER, Ph. D., Chemist and Sugar Maker, Audubon Park, New Orleans.
W. G. TAGGART, B. S., Assistant Chemist, Audubon Park, New Orleans.
R. E. GRAHAM, B. S., Assistant Chemist, Audubon Park, New Orleans.
WM. G. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
J. K. McHUGH, Secretary and Stenographer, Audubon Park. New Orleans.
A. SCHEER, Farm Manager, Audubon Park, New Orleans.
G. D. HARRIS, M.S., M. A., Geologist, Baton Rouge.
F. L. WHITNEY, Assistant Geologist, Baton Rouge.
J. E. HALLIGAN, B. S., Chemist, Baton Rouge.
H. L. GREEN, B. S., Assistant Chemist, Baton Rouge.
A. P. KERR, B. S., Assistant Chemist, Baton Rouge.
J. C. SUMMERS, B. S., Assistant Chemist, Baton Rouge.
R. BAUS, B. S., Assistant Chemist, Baton Rouge.
R. G. FULLER, B. S., Assistant Chemist, Baton Rouge.
W. D. REID, B. S., Assistant Chemist, Baton Rouge.
R. G. TILLERY, B. S., Assistant Chemist, Baton Rouge.
ROGER P. SWIRE, Treasurer, Baton Rouge.
WILMON NEWELL, M. S., Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
J. T. TANNER, B. A., Secretary and Stenographer, Baton Rouge.
IVY WATSON, Farm Manager, Calhoun.
E. J. WATSON, Horticulturist, Calhoun.
J. G. LEE, JR., B. S., in Charge of Feeding Experiments, Baton Rouge.
E. W. KERR, M. E., Professor Mechanical Engineering, Baton Rouge.
E. M. PERCY, B. S., Assistant Mechanical Engineer, Baton Rouge.

Louisiana State University

AND

Agricultural and Mechanical College

OFFICE OF STATE EXPERIMENT STATIONS.

BATON ROUGE, LA., Feb. 1, 1909.

To His Excellency, Jared Y. Sanders, Governor of Louisiana:

SIR—In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 16, 1906, known as the Adams Act, providing for federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1908, and a financial statement for the government fiscal year, July 1, 1907 to July 1, 1908.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by State law, I have combined these two reports and submit them herewith, so as to show the receipts and expenditures for twelve months. While the time covered by this statement does not coincide with the time covered by the report of the federal fiscal year, practically the same amounts are represented as would be if the statement were pushed forward one month for beginning and close. As the report is here given it will tally with the sums of the two reports on file with the State Auditor, and no special object would be gained by making a report with dates to correspond with the date of federal funds.

Respectfully,

W. R. DODSON, Director.

STATION NUMBER ONE.

Sugar Experiment Station, Audubon Park, New Orleans, Louisiana.

The work of this station remained under the direct supervision of Mr. R. E. Blouin, Assistant Director, up to October 1, 1908, when Mr. H. P. Agee, a graduate of the Sugar School of this University, was put in full charge as assistant director. Mr. Agee had been connected with the work of the sugar station for several years, but was in charge of a sugar house in Porto Rico at the time he was elected to succeed Mr. Blouin. He returned to New Orleans in time to spend several months with Mr. Blouin, familiarizing himself with the work of the station, and in this way the inconvenience and loss due to Mr. Blouin's departure has been minimized. The extensive experience of Mr. Blouin, and his thorough knowledge of the practical and technical problems of the sugar planter, enabled him to render exceedingly valuable service in many ways to the sugar interests of Louisiana. Indeed it was this service which drew the attention of the sugar interests of Argentina to him, and led them to make him such financial inducements to enter the service of the Republic, that he could not in justice to himself remain in Louisiana.

Mr. Agee is a very strong man in his preparation for the work, and has already exemplified his ability to take care of the work at the sugar station.

I submit herewith a general statement, prepared by him, of the work done during the past year, which is followed by the statements of Dr. Yoder and Mr. Owen, of the work of their departments. I recommend that this be published with the general statement.

The work of the stations in all departments progressed in a way that is gratifying to all who know of what has been accomplished.

I have departed from the practice heretofore in submitting a general report on the whole work, and have asked the heads of departments to submit brief statements regarding this work. These reports are here given over the signatures of the several men who have prepared them. In some instances they have been abbreviated by me.

Respectfully,
W. R. DODSON, Director.

New Orleans, La., Feb. 1, 1909.

W. R. Dodson, *Director,*
Baton Rouge, La.

My Dear Sir—

I submit herewith a general statement of the work of the Sugar Experiment Station during the past year, including a statement from Dr. Yoder, of the chemical work, and of Mr. Owen, of the bacteriological work.

The good growing season and excellent harvest period that prevailed throughout the State have been of value to the field experiments of this station during the past year. The cane crop of the station may be considered as a good average in comparison with other years, in respect to tonnage and sugar content.

IRRIGATION.

Owing to the abundance and even distribution of rainfall during the growing period, there has been no occasion to use the irrigation plant, as had been frequently necessary during years past.

CULTIVATION AND FERTILIZATION.

Work along the lines of cultivation and fertilization has been a continuance of the experiments previously inaugurated for the purpose of securing data from a number of years, so as to obtain results covering such a wide range of varying seasons and conditions, as not to be vitiated by uncontrollable influence so imminent to field experimentation of all classes.

The great difference of opinion concerning the many points involved, which exists among plantation managers, bears evidence to the importance of obtaining conclusive data along such lines.

SEEDLING CANES.

In the report of a year ago, mention was made of the propagation of new varieties of cane from seed of this station. Heretofore we have been dependent upon the importation of these seedlings from the various experiment stations and botanical gardens of the tropics, where conditions are better suited for the germination of cane seed. However, it is a great pleasure to be able to say that our work along this line during the past two years has been so successful that this method of producing new varieties of cane may now be considered permanently established as an important phase of this station's work.

The first year the growth of a seedling is always dwarfed and the sugar content low, and the plants present no indication as to what they will ultimately do. These canes are planted and the second year full-sized stalks are produced, and an idea can be gotten as to which are the more desirable. The third year's results must be awaited, however, in order to obtain data as to tonnage and sugar content. The property of seed variation common to all plants is so pronounced in the cane that the widest variations in color, size, sugar content, and general manner of growth is noted in seedlings of the same cane tassel. From this variation there is a chance of securing a seedling superior in every way to the mother cane. In 1907, about one hundred plants were produced from seed, and the second year's results obtained this year show nearly all of these to be vigorous growing canes, and some of them have a sucrose content that is quite high. Approximately five hundred were obtained in 1908. All of these are planted and their development is awaited with much interest.

A third crop is at present being germinated from an assortment of seed from nearly every cane-growing locality of the world. These are again under the immediate care of Mr. A. E. Weller, who has been so successful in his previous efforts. It is not safe to say at this time if any of the canes thus propagated by us will eventually prove preferable to those at present grown on the plantations, but from the results thus far obtained the indications are promising. The hope is felt that by this means a cane combining the properties of high tonnage and high sugar content may ultimately be had.

We are indebted to the government stations of many foreign countries, as well as to private individuals, for the courtesy of sending us cane arrows or tassels. Thus far no fertile seed have ever been produced in Louisiana. The station is still in active correspondence with the other cane-growing sections of the world and is importing for trial the best seedlings that are produced elsewhere.

Reports concerning the D. 74 and D. 95 canes, now so widely grown throughout the State, and originally introduced by this station from British Guiana (Demerara), continue favorably. A tabulation of results of these canes, as compared with the home canes, is now being prepared.

SUGAR HOUSE WORK.

The sugar house work this season has served as a means of completing the field data on the various experiments, and in addition has afforded an opportunity of studying certain problems of sugar manufacture. Work was done on the use of formaldehyde in factory work, and experiments were inaugurated in relation to the treatment of molasses with various chemicals prior to reboiling for low-grade products.

CANE HARVESTERS.

There have been no further demonstrations of cane loaders during the past year. A number of these devices which were first proved successful in the public trials held at this station, are now doing active work in the cane fields of the State. They have effected a considerable economy and have assisted materially in harvesting the past two cane crops.

Cane-harvesting machines are now attracting wide attention, and five different inventors—Luce, Hadley, Piatt, Loisel and Beauregard—have been at work on the station grounds this year, each endeavoring to perfect a machine. A special plat of cane has been set aside for the use of these men, and they are furnished whatever facilities we can offer. The problem of cutting, stripping and topping the cane by means of a machine is an extremely hard one. The obstacles which stand in the way of perfecting a machine of this character are difficult and perplexing, but it is beginning to be thought from the work done here during the past six months, that they are not insurmountable. Mr. Luce has made two public demonstrations of his machine this fall under the auspices of the station, in order to afford those interested an opportunity of viewing the operation of his device. The Luce harvester is drawn by mules. The topping and stripping devices are driven by a gasoline engine. The lines upon which Mr. Hadley is working are different, in that his machine is propelled and operated by a cable. Mr. Piatt is attempting a machine to be worked entirely by mule power and hopes to thus produce a machine that may be handled by ordinary plantation labor.

IMPROVED IMPLEMENTS.

The station welcomes at all times the testing of new or improved implements either for experimentation or public demonstration. We have been presented by one of the leading implement companies with a complete outfit of their latest models of plows, cultivators, etc. During the next few months there will be tests made of certain recently patented drainage devices.

MISCELLANEOUS.

Variety tests on cotton and corn have been continued. Forage crops have received attention, as heretofore. This work is co-operative, in a measure, with the Department of Agriculture, which annually distributes clovers, peas, alfalfa and other leguminous crops for trial.

An assortment of fiber crops is grown. We have this year supplied inventors of decorticating machines with material for tests. The growth of the *Phormium tenax,* a newly introduced fiber plant that grows in the waste marshes of Australia, is being watched with interest.

Renewed interest is being manifested in the use of bagasse as a paper stock. One of the large manufacturing plants making paper board is working with us to test the adaptability of bagasse for this purpose. Their attention has also been called to the waste cane tops, and plans are being made for an investigation of the paper-making qualities of this by-product of our industry. Certain experts have expressed opinion that this material possesses greater value as a paper stock than bagasse.

INSECT PESTS.

Among other things, Mr. J. B. Garrett, while working as entomologist for the station, did a very creditable work in introducing a natural enemy, the ladybird *(Cryptolaemus montrouzieri)*, to prey upon the "mealy bug" or pou-a-pouche *(Pseudococcus calceolariae)*, that has infested our cane fields. It is believed that if the ladybird can successfully withstand our winters, it will eventually eradicate the pou-a-pouche.

AUDUBON SUGAR SCHOOL.

The station, as usual, co-operated with the Audubon Sugar School of the State University, and the fourth and fifth year classes were given the practical work in chemistry, agriculture and sugar house operation during the ten weeks in which they were assigned for duty here. Year by year this course is meeting with greater appreciation, and is attracting students from many foreign countries.

PUBLICATIONS.

The following publications were issued during 1908:

The Use of Sulphur and its Combinations as Clarifying Agents in the Sugar Industry. By Fritz Zerban, Ph. D. Read before the Louisiana Sugar Planters' Association January 9, 1908. The Louisiana Planter, Vol. 40, p. 26.

On the Use of Hydrosulphites in the Sugar House. By Fritz Zerban, Ph. D. Read before the Louisiana Sugar Planters' Association, February 13, 1908. The Louisiana Planter, Vol. 40, p. 103.

Investigations on the Use of Sulphur and its Combinations in the Sugar House. By Fritz Zerban, Ph. D. Louisiana Experiment Station Bulletin 103.

On the Determination of Reducing Sugars. By Fritz Zerban and W. P. Naquin. Journal American Chem. Society, Vol. 30, p. 9.

Spring Plant Cane versus Fall Plant. By H. P. Agee. Read before the Louisiana Sugar Planters' Association, October 8, 1908. The Louisiana Planter, Vol. 41, p. 235.

CHANGES IN STAFF.

Since the last report there have been many changes in the station staff. Mr. R. E. Blouin, formerly assistant director in charge, has resigned to accept a position to establish and direct a sugar experiment station in Tucuman, Argentine Republic. Dr. Fritz Zerban, formerly research chemist, has left to assume the directorship of the "Estacion Experimental" of Peru. He has been succeeded by Dr. P. A. Yoder, formerly of the Utah Experiment Station. Mr. W. P. Naquin has resigned, and now occupies the position of chemist for the Olaa Sugar Company of Hawaii. Messrs. A. B. Joffrion and P. H. Doherty have both given up their positions as chemists here to take up similar work for the Cuban-American Sugar Company. These vacancies in the force have been filled by Mr. R. E. Graham, a State University graduate, and Mr. W. G. Taggart, who was transferred to us from the Baton Rouge Station. The force has also been increased by the addition of a bacteriologist, Mr. W. L. Owen, formerly of the Georgia Experiment Station. A discussion of this new bacteriological department is given in a separate report by Mr. Owen. The work of the chemical laboratory is also presented in a separate report by Dr. Yoder.

Very respectfully submitted,

H. P. AGEE,

Assistant Director in Charge.

SUGAR EXPERIMENT STATION, AUDUBON PARK,
NEW ORLEANS, LA., Jan. 7. 1909.

W. R. DODSON, *Director,*
Baton Rouge, La.

DEAR SIR—

Per your request, I submit herewith a report of the Department of Chemistry of the Sugar Experiment Station of the Louisiana State University and A. and M. College for the year 1908.

The work of this department was continued during the first half of the year along the line of methods of clarification of cane juice, on the occurrence of sulphur in molasses, and on organic acids in cane. The bulletin on the use of sulphur and its combinations in the sugar house was finished in this part of the year. Incidentally, some work was undertaken on the methods of determining the reducing sugars. Of miscellaneous analyses from outside sources, fifty-nine samples were analyzed and reported. During the latter half of the year the work was more or less interrupted because of changes in the staff, which are being noted in another report from this station. Some new lines of experiment were started in determining some of the rarer constituents of the cane juice and sugar house products, which may have important influences on the extraction of the sucrose and upon the appearance and taste of the products. In the beginning of this work it was noted that the methods usually applied for the determination of some of these constituents, especially the organic acids, have been worked out for the examination primarily of alcoholic fermentation products, and need variation to adapt them to the analyses of sugar cane products. Work on these methods of analysis is now in progress.

The usual chemical control work was carried out during the grinding season, and samples from the mill representing the products from the sugar house were obtained and reserved for future reference or investigation. Many analyses were made in connection with the variety tests of ordinary and seedling canes. In connection with the work of the bacteriologist, the chemical department has been called upon to make a number of analyses. It is proposed to continue work on some of the rarer constituents of the cane and its products, and to furnish the necessary chemical control in the bacteriological investigations which suggest themselves from time to time, and for which the necessary material and apparatus are available.

The main laboratory received a general overhauling and much-needed improvements were made in the appearance of that room. This work should be extended to other rooms of the department as soon as time and available means permit.

Respectfully submitted,

P. A. YODER, *Chemist.*

Sugar Experiment Station,
New Orleans, La., January 7, 1909.

W. R. Dodson, *Director,*
Baton Rouge, La.

Sir—

I have the honor to submit the following report from the Department of Bacteriology:

Since the creation of this department in July, 1908, and the subsequent completion of its laboratory equipment in August, the work conducted has been largely of a general rather than of a specific nature. The plans for the work, however, have contemplated the investigation of the inversion of sugars by bacteria, and such preliminary work as has been conducted has been with this view. Through the courtesy of the authorities of the New Orleans Sugar Exchange and the sugar interests of the State, a great variety of sugar products have been furnished for study, from which have been isolated many species of organisms that are now being studied experimentally in the laboratory. Several species isolated from these sources, and which are now being grown in pure cultures, have shown marked inverting power when introduced into cane juices and sugar crystals; others are proving of great interest on account of other detrimental changes that they effect in these products.

The work in general has comprised three lines of experimentation, viz:

(1) The study of the bacterial flora of sugar products.

(2) The determination of the factors that predispose to the bacterial inversion of these products.

(3) The extent of the occurrence of the inverting type of bacteria throughout the sugar houses of the State.

The results so far obtained are of great interest, and it is of especial significance, even at this stage of the work, to note the uniform prevalency of certain species in all of the products so far studied. A large number of specially selected samples of sugar products are kept under observation in the laboratory, chemical and bacteriological analyses of which are made at definite intervals in order to associate the changes in their chemical composition with qualitative or quantitative changes in their bacterial content. In this way much helpful data are being secured and it is hoped that certain deductions of wide application may be made therefrom.

Efforts are being made to secure additional material for study from different parts of the world, and judging from present indications the available material will be greatly increased in the near future.

Very respectfully submitted,
WM. L. OWEN, *Bacteriologist.*

STATION NUMBER TWO.

State Station, Baton Rouge, Louisiana.

The office of the Director is maintained at Baton Rouge, in the Experiment Station building, on the University campus. The laboratory for analysis of feed stuffs and fertilizers for the State Board of Agriculture is maintained at the Baton Rouge Station. All the publications are issued from this station.

Mr. S. E. McClendon, Assistant Director, has remained in charge of experiments on the farm. The following is a summary of his report:

Farm Department.

The work on the Experiment Station farm has been continued along the same lines indicated in the last annual report. Most of the investigations carried on here required an extended period of years to secure reliable data on the subjects under investigation. The season has been very good for most crops, but quite disastrous to the cotton crop, which suffered great loss from excessive rains in July and August.

COTTON.

Owing to the fact that the boll weevil is forcing the planting of early varieties of cotton, there are a great many new varieties being put on the market, claiming special merit in this respect. Many of these have been grown in our variety plats, where their merits can be thoroughly tested and compared. The varieties introduced from foreign countries for breeding purposes have shown that they are able to adapt themselves to the new conditions, and this year have grown a much smaller stalk while producing an earlier crop, as well as an increased yield. The varieties have also been tested for their resistance to the *wilt disease,* which is becoming more widely distributed each year. The tests of commercial fertilizers used alone and in combinations has been continued with variable results.

CORN.

There was a very good crop of corn produced the past year, but the storms in July and August vitiated the results of a number of experiments.

The usual variety of fertilizer tests were made. The results show again the superiority of the strains of southern origin.

The Williamson method of planting, cultivation and fertilization of corn was inaugurated this year, and will be continued until definite resutls are secured. Our work this year would indicate that it was the extra fertilizers used that produced the corn, rather than the method of planting and cultivation.

OATS.

We continued planting the different varieties of oats, none of which have been able to successfully compete with the home-grown seed. The rains in May this year delayed the harvest several weeks, and at the same time damaged the crop about one-half.

The many usages to which an oat crop can be put, with the crops that follow, thereby securing two crops per year from the same land, should commend it to the farmers as a profitable crop to grow. From experiments conducted at the station for several years, there has been no pasture crop grown that would produce the winter grazing that can be secured by the planting of good southern-grown oats.

FIBER CROPS.

We have maintained small plats of ramie, jute, hemp and flax. Ramie and jute both grow well. As a result of a test made on the decorticating machine, by the Schlichten Ramie Company of Philadelphia, we are more encouraged than we have ever been before to hope that a machine will be perfected for decorticating this fiber. We also sent a couple of hundred pounds of ramie to a firm in St. Louis, who claim to have successfully separated the fiber in an entirely satisfactory manner, and this company is at the present time making arrangements to erect a factory in the Red river valley for the manufacture of ramie products.

We have sent out to a number of parties in the State enough ramie roots to make thorough tests of the adaptability of the plant to some of the leading soil types on which it has not been previously thoroughly tested. While the manufacturers of the decorticating machine feel confident that they have overcome the difficulties in the way of working the ramie fiber satisfactorily, they have not yet fully demonstrated this fact to the satisfaction of the station. If they have been as successful as they claim, ramie may become an important fiber crop in some of the territory where the boll weevil has been so disastrous.

FORAGE CROPS.

The usual number of forage crops have been grown. Of the new plants grown, "Guinea grass" seems to be quite promising for the wet or overflow lands of the southern part of the State. This year the grass was not injured after being covered with water for six weeks.

After selecting soy beans for four years, we have several varieties that are quite promising, this year producing profitable crops of beans. Experiments have been planned to secure additional information on this crop.

Of the many clovers, grasses, etc., tried at this station for hay, we have found nothing that combines the many good qualities of lespedeza, and at the same time producing the same quantity. This year we cut as much as 3.4 tons of well-cured lespedeza hay per acre.

ROOT CROPS.

A number of root crops have been successfully grown, producing a large quantity of feed during the winter months, when feed is most needed, and at the same time occupying the land after and between other field crops. During the past year we have tested the value of stock beets and sweet potatoes as hog feed, the results of which were entirely satisfactory, and will be published in the near future.

STOCK BREEDING AND RAISING.

A great deal of attention has been given to the breeding and raising of live stock. During the past year, we have sold a number of cattle for breeding purposes, all of which have given satisfaction. The registered Angus and Hereford cattle bought two years ago have developed into nice animals, and attract quite a bit of attention from visitors. The get of the bulls are of marked superiority.

SHEEP.

The work of breeding up a bunch of sheep has progressed satisfactorily. During the past year we tested the practicability of feeding sheep salt and tobacco as a preventive measure against internal parasites. This was not as successful as we had hoped for, yet some beneficial results were secured. This year and next we hope to demonstrate that lambs can be successfully and profitably grown for the early market.

HOGS.

Hogs have been used in testing the value of the different grazing and root crops. This fall the demand for hogs for breeding purposes has been unusually heavy, and our best pigs have been sold for this purpose. There has been added to our herd a pair of Tamworth pigs, which is a representative of the bacon hogs.

SILO.

This is the third year we have used ensilage as a food, with good results. It has been demonstrated without a doubt that silos are as satisfactory and practical here as in the North and should be more generally used.

STEER FEEDING EXPERIMENTS.

We have carried on during the past year more extensive feeding experiments than previously undertaken. The results of this work are about ready for publication, and will be issued in bulletin form in the very near future. The results have again indicated the practicability of fattening cattle profitably, using our home-raised feeds extensively.

Department of Animal Pathology.

W. R. Dodson, *Director,*
Baton Rouge, La.

Dear Sir—

The principal pathological work of the department during the past year was conducted by Dr. H. J. Milks, late assistant veterinarian and bacteriologist of the station, whose entire time was devoted to research in connection with animal diseases, especially of a bacterial nature.

As indicated in the last report, investigations have been conducted with the view of obtaining more accurate data concerning "cerebro-spinal meningitis," or so-called "blind staggers," in horses; certain features with regard to the immunization of animals against anthrax or charbon, and to determine the potency, or otherwise, of commercial vaccines on the market. Also, to discover, if possible, the casual factor or factors, producing certain fatal diseases of chickens.

A report of the results of each investigation has been issued in bulletin form and distributed to the public. This department has, during the year, been requested and has made many bacteriological diagnoses of material sent in, especially in cases of suspected anthrax, tuberculosis, glanders, hog cholera, etc. Two, or perhaps three, outbreaks of specific hog cholera occurred in the state during the year, which were investigated by the department and traced to the importation, from other States, of hogs for breeding purposes. So far as I am aware, the infection did not spread from the original foci, as no other authentic cases have been reported from other sections of the State.

At the invitation of Dr. A. D. Melvin, Chief of the National Bureau of Animal Industry, I represented the Experiment Stations at a "hog cholera" conference, in July, at Ames, Iowa, where the government farm is located, on which representatives have been experimenting for several years to obtain a vaccine that would protect hogs against the cholera. They consider that they have at last met with success, and it was to permit representatives of the different States to become familiar with the technique of the work and be able to prepare the vaccine at home to meet home requirements that the invitation was extended. The preparation of the vaccine is quite expensive, as it requires a plant especially arranged for the work and the destruction of quite a number of animals. It is questionable whether the limited amount, if any, of the infection at present existing in the State would warrant the erection and running of a plant at the present time. Should the necessity arise in the future, however, no doubt the preparation of this vaccine will be undertaken by the station.

During the fall, I presided at the forty-fifth annual meeting of the American Veterinary Medical Association at Philadelphia, and subsequently was in attendance at the twelfth annual meeting of the Interstate Association of Live Stock Sanitary Boards, at Washington, D. C., where I had the honor of election to the presidency for the ensuing year. At each of the meetings I represented the Experiment Stations.

Owing to my position of professor of veterinary science in the Louisiana State University, as well as veterinarian to the stations, a great part of my time has been taken up with class work during the session of the University. At the same time, however, I have been able to devote a considerable portion of time to veterinary and animal husbandry work at the station, and have conducted all, or nearly all, of the correspondence in connection with both departments, which is largely on the increase from year to year.

This department, in co-operation with Mr. J. G. Lee, Jr., who is in charge of the work, and the chemical department of the station, has inaugurated a series of experiments to obtain the digestion coefficients of several of our stock feed materials that have not been hitherto accurately ascertained. As soon as the experiments are completed, the results will be made public in bulletin form.

The department has in course of preparation a bulletin on the subject of stock feeding, which will be published soon, to take the place of No. 86, which is almost exhausted on account of the extensive demand made for it.

Dr. Milks, assistant in the veterinary department of the station, resigned during the year to take up private practice in his native state, New York.

Respectfully.
W. H. DALRYMPLE.

Dairy Work and Feeding Experiments at Hammond, Louisiana.

W. R. Dodson, *Director,*
Baton Rouge, La.

Dear Sir—

During the year the Experiment Station, in co-operation with the Dairy Division, National Bureau of Animal Industry, has conducted some very interesting experiments in feeding "blackstrap" molasses to young calves as a supplement to skim milk, the results of which have been published as Experiment Station Bulletin No. 104. It might be well to state that the results show very conclusively that "blackstrap" cannot be used as a supplement to skim milk in calf feeding. This bulletin has served to answer many inquiries in regard to the feeding of molasses to young calves.

A feeding experiment was conducted to test the value of cold pressed cotton seed cake as a feed for dairy cows, the results of which have been published as Experiment Station Bulletin No. 110, and contains some valuable data. Such gratifying results were obtained in milk production while performing this experiment, an ideal balanced ration being fed, that the writer was besieged with inquiries regarding balanced rations. This particular phase of the work has been encouraged as much as possible.

The Experiment Station also took up the work of growing feeds in co-operation with Mr. E. Consterdine & Bro., these gentlemen being leaders in the dairy industry in the Hammond vicinity. Very satisfactory results have been obtained, particular attention being given to the growing of root and leguminous crops. Mangel wortzels produced 22 tons to the acre and sweet potatoes produced 200 bushels per acre with 12 tons of vines, which have proved to be very valuable for soiling purposes. By growing a large amount of his feed stuff on the farm, Mr. Consterdine has reduced the cost of feed at least 30 per cent. It is to be hoped that other dairymen will follow the example and grow more feed, thereby increasing the net income from the dairy.

The record work has been kept up for the year, and has proved to be an excellent way of gaining knowledge of each individual animal in the herd, and has also served to promote a more systematic form of feeding and breeding, thus bringing the herd up to a better standard.

Very respectfully,
J. G. LEE, *JR.*,
In Charge of Feeding Experiments.

Department of Plant Pathology.

W. R. DODSON, *Director,*
Baton Rouge, La.

DEAR SIR—

During the past year the work in the Department of Plant Pathology has been almost entirely of a research nature. Several of the important diseases of the plants of the State are being investigated carefully and notes on others as to their occurrence, severity, etc., are being taken. On account of the warm, humid climate of the State and the mild winters, plant diseases are especially abundant. We have no way of estimating the annual loss to the State from these troubles, but it must be enormous. The climatic conditions are especially favorable for the development of soil diseases, such as the various root rots and wilt diseases. It is the aim of the department to work out carefully the life history of the disease causing organisms, the effect on the host plants, and the methods of control as far as possible.

At the beginning of the year, Mr. H. R. Fulton was in charge of the department, but he severed his connection with the station on February 1, 1908. Previous to his departure he published the results of his work in three bulletins as follows:

Bulletin No. 100, The Root Disease of Sugar Cane.
Bulletin No. 101, Diseases of Pepper and Beans.
Bulletin No. 105, Diseases Affecting Rice in Louisiana.

The writer took up the work where it was discontinued by Mr. Fulton. Some of the diseases on which he had been working have been investigated further, and also some other ones which seem to be particularly important. The following is a brief outline of the work as conducted during the past season:

Bean Anthracnose.—This disease of beans, perhaps more commonly known as "rust" or "pod spot," has received a considerable portion of the available time. The diseases caused a great loss throughout the State, especially in the trucking districts. The green podded varieties have taken the place of the wax varieties in many localities on account of this trouble. New data in regard to the relation of the causative organism to various other micro-organisms has been obtained, and the results look very encouraging from the standpoint of the control of the disease.

Sclerotium Wilt Disease.—This disease, which causes a wilting and death of many plants, especially truck plants, has been studied carefully, particularly in regard to the tolerance of the fungus to various poisons, etc., The disease is common in certain portions of the State and will probably become more so as the trucking industry increases, and it is hoped that some practical means of control may be obtained.

Cotton Boll Rots.—Our knowledge of these at present is very limited, notwithstanding the fact that 10 to 20 per cent of the cotton crop is lost each year on account of them. A number of organisms are concerned in the rots and an attempt has been made to get at the exact relation of the different forms to each other and to the decay of the bolls. The occurrence of the different forms on a large number of bolls has been tabulated, the organisms have been isolated in pure culture, and some inoculation experiments have been undertaken. A better knowledge of the life history of one of the organisms, the cotton anthracnose, has been obtained in the discovery of the ascigeral stage developing naturally on the bolls in the field.

Cotton Wilt.—Work on this trouble has been confined to the breeding and growing of resistant varieties. The United States Department of Agriculture resistant cottons, "Dixie" and "Dillon," have not proved satisfactory under Louisiana conditions, especially since the arrival of the boll weevil. It is hoped that we may be able to obtain a cotton that is not only wilt resistant, but one that is early and adapted to Louisiana climate and soil.

Rice Diseases.—The fungus diseases of rice, the "blast" and "smuts," have been investigated, though they are not a serious menace to rice growing. However, the smuts are extremely interesting from a scientific standpoint, as they do not seem to have the same life history as the smuts of other cereals, and it is hoped that more data may be obtained on them. A physiological trouble known as "sterile heads," which causes a great loss in southwestern Louisiana, has also been investigated.

Other plant diseases, including a serious alfalfa disease, and the root rot of sugar cane, have been studied as time has permitted.

Very respectfully,
C. W. Edgerton, *Plant Pathologist.*

ENTOMOLOGICAL WORK.

W. R. Dodson, *Director,*
Baton Rouge, La.

Dear Sir—

In response to your recent request, I beg to give you the following report of entomological work done by me during the past year:

For a number of years the sugar cane at the Sugar Experiment Station at Audubon Park and along the lower Mississippi river has been infested with the sugar cane mealy bug, *Pseudococcus calceolariae,* and it seemed to do considerable damage to the young germinating cane. In the spring of 1907 I made a study of its life history and habits and carried out experiments to ascertain whether or not it could be successfully held in check by the application of sprays, fumigation, etc. I also introduced from California a colony of ladybirds, *Crytolaemus montrouzeiri,* a natural enemy of this pest, and established it in the field at the Sugar Station. These ladybirds increased very rapidly and succeeded in almost completely clearing the mealy bugs from the plot of cane in which they were liberated. I also discovered a native fungus disease, which destroyed a large per cent of this pest during the rainy weather last summer.

I made several trips to the rice fields in Acadia parish and made investigations of the damage being done to the rice by insect pests. It was found that the Southern corn root worm, *Diabrotica 12-punctata,* was destroying the early stands of rice in a great many fields, and I therefore carried out experiments to determine methods of control for this pest. It was found that a good early flooding of the rice would kill the larvæ of the beetles and drive away the adults.

It was ascertained that some damage was caused to the young rice by the sugar cane beetle, *Ligyrus rugiceps,* and I made investigations looking toward its control. It was also found that flooding would drive this pest from the field.

The water weevil, *Lissorhoptrus simplex,* was found to be very abundant in the rice fields all during the summer, and experiments were conducted to ascertain methods of control of this insect. Some farmers had made a practice of drawing off the flood water to kill the larvæ and drive away the adults, but I found that when such practices were carried out the rice suffered more for the want of water and from being crowded by the grasses than from the insects. My experiments showed that where a sufficient quantity of water was kept on the rice that the plant suffered less than when dry or only a small amount of water was over the ground.

Very respectfully,

J. B. Garrett, *Associate Entomologist.*

Tests of Sugar House Machinery.

Baton Rouge, La., February 1, 1909.

W. R. Dodson, *Director,*
Baton Rouge, La.

Dear Sir—The following is a brief statement of the work done during the past year:

This new field has been entered by the station for the purpose of gathering experimental data upon the performance of the varied machinery with which the sugar manufacturer has to deal. It is hoped that by means of the data thus obtained comparisons may be drawn of different types of machines as well as of modes of operation.

A report of the first work done in this line is given in Bulletin No. 107 of the station. under title of "Preliminary Tests of Sugar House Machinery." It describes and gives the results of tests to determine the power required to run a six-roller mill, a cane carrier, and two sets of centrifugals.

During the 1908-09 grinding season, experiments of a preliminary character were made at the Audubon Park sugar house to determine the steam consumption of a double effect under varying conditions of steam pressure, juice head, and vacuum; the steam consumption of a vacuum pan under varying conditions; the relative steam consumption of open pan and vacuum evaporators; the steam consumption of an open clarifier; the performance of a filter press under varying conditions of operation and the energy required to operate a nine-roller cane mill when grinding different kinds of cane. In order to measure the condensed water and get other necessary data, additional apparatus, such as traps, gauge glasses, etc., were purchased.

Much of the work just described was of such a preliminary character that the data gathered will not be reported, though other portions will be included in a forthcoming bulletin.

The more important work in this line is that done this session in sugar factories of Louisiana and Cuba, for the purpose of gathering data upon the performance, under varying conditions of operation, of the different types of furnaces for burning bagasse. The expense for fuel is one of the largest in the sugar house, amounting from $4,000 to $20,000 per season for a house of 1,000 tons capacity per 24 hours. The question of the form of furnace and its mode of operation for the best utilization of the bagasse as a fuel is evidently, therefore, of great importance; and, with this in view, observations were made and data gathered upon some thirty furnaces in Louisiana and twelve in Cuba by a corps of trained men.

The furnaces tested represent a wide variety of types and the observations were such as would facilitate comparisons as to grate furnace; ratio of heating surface to grate surface; form and dimensions of furnace; furnace temperature; stack temperature; weight, moisture and calorific value of the bagasse; quality of the flue gases; draft in furnace and stack; quantity of air supplied, etc. The results of this series of investigations will be given in a forthcoming bulletin.

Respectfully,
E. W. KERR,
Professor of Mechanical Engineering, Louisiana State University.

RICE EXPERIMENTS.

Experiments at Crowley have been continued in co-operation with the National Department of Agriculture. The work covers an extensive series of tests of the influence on yield and quality of grain by nitrogen, phosphoric acid and potash and the various combinations of these fertilizing ingredients.; a further study of the large number of varieties of rice secured from the various rice-growing countries of the world, and investigations along the lines of injurious insects and parasitic diseases, as mentioned elsewhere in this report. Considerable valuable data has been obtained, but on account of lack of funds to put into this work the experiments have not been as extensive or as exhaustive as the importance of the work justifies.

The last Legislature authorized the State Board of Agriculture to establish a regular rice substation, but no appropriation was made for carrying this act into effect, and it does not appear that the rice planters are yet ready to meet all the expense of establishing and equipping an experiment station. The importance of the rice crop of the State, the decreasing yield per acre, the increasing ravages of insect and fungus pests, the growing demand for investigation of many problems that influence the profits of rice production, make it imperative that we should heed the requests of the rice growers for a rice experiment station. It is sincerely hoped that means may be found for establishing the station before the next meeting of the Legislature, and that they will make provision for its maintenance.

CORN CLUBS.

In co-operation with Col. Chas. Schuler, Commissioner of Agriculture, a number of corn clubs were established among the schoolboys of the State. The boys were furnished with enough good corn seed to plant a half acre. The Commissioner furnished the seed and the Director of the Station aided the teachers and parish superintendents in the organization of the clubs, and a study of the best methods of corn production. Prizes were offered by the Commissioner of Agriculture, the Director of the Stations, the parish fairs and the State fair for the best exhibits and the best acreage production. Although the past season was unfavorable for corn, the boy winning the first prize gathered twenty-seven and a half bushels from a half acre of land. About forty boys sent exhibits to the State fair. Much interest was manifested in the work, and I am confident a great deal of good has been accomplished. Prof. V. L. Roy, Superintendent of Avoyelles parish, has been the most active worker in this enterprise. He thinks the work has been worth many thousands of dollars to the farmers of Avoyelles. We offered to purchase the crop of some of the prize winners at two dollars per bushel, wishing to use this corn to distribute to new clubs the coming year. We found that the entire output of the prize winners had been engaged by local farmers and we were not able to purchase any of it.

There are great possibilities for this work, and everything possible should be done to encourage it.

Horticultural Work.

The horticultural work has been continued along lines previously reported. During the year Bulletin No. 112 was published, giving the most important facts brought out by the orchard experiments for a long series of years. The work along the lines of variety and fertilizer tests with fruits and vegetables will be discontinued, and new work undertaken.

PECAN ORCHARD.

The station has arranged with Mr. N. S. Dougherty for growing a pecan orchard, in which twelve of the leading varieties of pecans have been planted, about a mile and a quarter north of the University grounds. The station furnished the trees and put them out. Mr. Dougherty has agreed to take care of the orchard and maintain it as a pecan orchard, giving the station an opportunity to carry on any desired investigations, but the fruit of the orchard will belong to Mr. Dougherty.

The great interest being manifested in pecan growing brings many inquiries to the station on this subject, and it is reasonable to expect great developments in the industry.

HOT HOUSE.

During the fall and winter a hot house has been constructed on the northern limits of the University grounds, at a cost of approximately six thousand dollars, including all expenses. The structure is of iron frame, and modern in every respect. The tables are of indestructible material and cement walks are laid between the tables throughout. The east wing is divided into three compartments for the use of the entomologist, plant pathologist, and a room for special propagation work. Owing to delay in shipment of material and in construction work, we will not be able to make full use of the house until next winter, as it is now too late to begin extensive work for this winter. This building will add greatly to the facilities for carrying on work of special interest to those engaged in the production of early vegetables and green house products, as well as giving increased facilities for studying insect life and fungus diseases.

TICK ERADICATION WORK.

In the effort to eradicate the cattle tick from two parishes in North Louisiana, the Experiment Station has contributed the services of one man for about six months of the year, the remainder of the work being carried by the State Crop Pest Commission, and the federal government. It is hoped that the day is not far distant when the farmers generally will come to a realization of the possibility of controlling this pest. The previous work of this station, in working out the life history of the tick, and means of exterminating it, has made it easily possible to control the tick, and the disease it conveys, wherever the cattle can be confined for a comparatively short time by fences.

EXHIBITS AT THE STATE FAIR.

Again the station made exhibits at Shreveport at the State fair. We are indebted to Mr. R. Glenk, curator of the State Museum, for valuable services in arranging the exhibits in an attractive manner, and for his aid in many other ways. The exhibit attracted attention and many favorable comments were received. We had the most instructive exhibit we have yet prepared. There is no doubt of the great good accomplished by these exhibits in putting the work of the stations before the people and in stimulating an interest in, and developing a more extensive appreciation of, the work being done by the experiment stations.

INSTITUTES, PUBLIC LECTURES, ETC.

The Director of the Stations visited most of the summer normal schools during the past summer and gave lectures to the teachers on teaching agriculture in the public schools. A great deal of interest is being taken in this subject by the teachers and by the parish superintendents, and it is confidently believed that we will soon be doing much effective work in this line. Some good work is now being done in a few of the schools. The Director has also given a number of lectures to farmers' organizations. Ten institutes, under the auspices of the State Board of Agriculture were held by Mr. Garrett of this station, Mr. Rosenfeld of the Crop Pest Commission, and Mr. Bland, employed by the Commissioner of Agriculture.

The station has been represented at a number of the most important conferences and conventions of national organizations, and has had a full share of the official honors and responsibilities of these associations. It is gratifying to all loyal Louisianians to know that our own experiment station is looked upon as a leader in the lines of investigation that are of paramount interest to southern agriculture.

BUILDING AND EQUIPMENT.

The frame building now occupied by the office and laboratories of the experiment station has become so crowded as to hamper the work. The growth and importance of the work justify better facilities, and more room is imperative. The danger of fire is imminent in a frame building so large, and where, of necessity, so many gas burners are almost constantly in use. Should a fire occur, it is hardly probable that the greater portion even of valuable records, vouchers and books could be saved. There is not even a fire-proof vault on the grounds in which valuable records can be stored.

The work of the Agricultural College is scattered in several buildings, where classrooms are small and poorly lighted. It is sincerely hoped that the next Legislature may find means of providing an agricultural building, in which may be housed all of the several agricultural branches of the college, with the offices and laboratories of the Experiment Stations.

CHANGES IN STAFF.

The following were the changes in the staff of the Experiment Stations during 1908, some of which are noted under their respective departments:

Mr. R. E. Blouin resigned the Assistant Directorship of the Sugar Experiment Station.

Mr. Hamilton P. Agee succeeded Mr. Blouin.

Major J. G. Lee, Assistant Director of the North Louisiana Experiment Station, resigned this position in December, 1908.

Mr. J. B. Garrett was appointed as Major Lee's successor.

Mr. H. R. Fulton, Plant Pathologist, left the Station early in the year.

Dr. C. W. Edgerton is Mr. Fulton's successor.

Dr. H. J. Milks resigned the position of Animal Pathologist.

Dr. Fritz Zerban left the Sugar Station during the summer.

Dr. P. A. Yoder was appointed Chemist of the Sugar Station to succeed Dr. Zerban.

Mr. W. L. Owen was made Bacteriologist of the Sugar Experiment Station.

Mr. E. J. Watson returned to the North Louisiana Station and resumed the position of Horticulturist of that station.

Mr. G. L. Tiebout was appointed to the position of Horticulturist of the Baton Rouge Station.

Messrs. W. P. Naquin, P. H. Doherty, B. F. Hochenedel, R. E. Graham and A. B. Joffrion were appointed assistant chemists of the Sugar Experiment Station.

Messrs. Naquin, Doherty, Hochenedel and Joffrion resigned their positions to enter the commercial field.

Mr. W. G. Taggart was transferred from the position of assistant chemist at the Baton Rouge Station to a similar capacity at the Sugar Experiment Station.

Messrs. R. G. Fuller, W. D. Reid and R. G. Tillery were appointed assistant chemists for the Baton Rouge Station.

Mr. E. W. Kerr, M. E., Professor of Mechanical Engineering in the Louisiana State University, and Mr. E. M. Percy, a 1908 graduate of the same institution, have been added to the staff of the Stations and are conducting a series of investigations into the practices of the sugar houses of the State with particular reference to engineering problems.

PUBLICATIONS ISSUED DURING THE YEAR 1908.

Twentieth Annual Report.

Bulletin No. 100—The Root Disease of Sugar Cane.

Bulletin No. 101—The Diseases of Pepper and Beans.

Bulletin No. 102—Dairy Herds and Their Milk Production.

Bulletin No. 103—Sulphur and Its Combinations in the Sugar House.

Bulletin No. 104—Feeding Blackstrap Molasses to Young Calves.

Bulletin No. 105—Diseases Affecting Rice in Louisiana.

Bulletin No. 106—Cerebro-Spinal Meningitis of Horses.

Bulletin No. 107—Preliminary Tests of Sugar House Machinery.

Bulletin No. 108—A Preliminary Report on Some Diseases of Chickens.

Bulletin No. 109—Experiments with Bacterium Anthracis, Anthrax Vaccines and Hyperimmunization.

Bulletin No. 110—Comparison of Cotton Seed Meal and Hulls with Cold Pressed Cake as a Dairy Feed.

Bulletin No. 111—Rotation Experiments with Cotton, Corn, Cow Peas and Oats.

Bulletin No. 112—Orchard Report of the Baton Rouge Station.

Bulletin No. 113—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 114—Analyses of Commercial Feedings Stuffs.

Circular on the Production of Swine in Louisiana.

Circular on Peanuts.

State Geological Survey.

W. R. Dodson, *Director,*
Baton Rouge, La.

My Dear Sir—

The following is a report of the geological survey work conducted by me during the year 1908:

I continued work during the summer and early fall on the literature and in the field preparing a report on the oil and gas of Louisiana. I was assisted in the early fall by Messrs. Perrine and Hopper. Work has been carried on mainly in the Caddo field, though maps and reports of other fields have been checked up to date. Since November, 1908, the work has largely been carried on by funds from the Uunited States Geological Survey. Mr. Hopper is now leaving the field and will assist in preparing the Oil Report. Dr. Maury has classified all the fossils heretofore collected in the State, mainly to assist in working out the stratigraphy of the oil regions. Mr. Hinton, paid by the Coast and Geodetic Survey, has continued tide observations at our station on Week's Island. The Report on Salt is practically completed, but we are already in debt with no funds for publishing our Oil Report.

Yours truly,
G. D. Harris, *State Geologist.*

Analyses of Fertilizers, Feed Stuffs and Paris Green.

W. R. Dodson, *Director,*
Baton Rouge, La.

Dear Sir—

In response to your request, I beg to submit the following report covering the work performed in the laboratory on the analyses of fertilizers, feed stuffs and paris green:

General Summary.	1905-06.	1906-07.	1907-08.
Fertilizer analyses made...........	1,075	1,160	2,263
Feed stuffs analyses made..........	643	1,581	3,343
Paris green analyses made.........	73	214	40

Commercial Fertilizers.	1905-06.	1906-07.	1907-08.
Complete fertilizers	1,302	2,164	2,665
Fertilizers containing phosphoric acid and nitrogen, not tankages.	40	67	192
Fertilizers containing phosphoric acid and potash	54	95	214
Acid phosphates	199	486	597
Bone meals	123	206	288
Tankages	372	206	357
Cotton seed meals	328	864	764
Chemicals	38	58	123
Miscellaneous	52	15	67
Total analyses	2,508	4,161	5,267

The number of samples of fertilizers received at the laboratory the past season shows an increase over previous years, due no doubt, to the increasing number of brands put on the market. The manufacturers in most cases met their guarantees.

On account of the keen competition and the increasing cost of nitrogen, manufacturers are apt to use low-grade nitrogenous substances in compounding their fertilizers. An example of this was brought to us when a manufacturer put out a fertilizer under the name of "Foreign Imported Tankage," which was imported from some foreign country. An examination of this material revealed the presence of wool waste, shoddy, hair and leather. The results of our investigations proved that the material was not suitable for plant food on account of its low availability. The purchaser and the manufacturer were acquainted with our findings. When the manufacturer could not dispose of this material in its original form, it was sold mixed with one of their brands of complete fertilizer. Adulteration of this kind shows the necessity for our fertilizer law and the strict enforcement of the same.

Fertilizer recipes were sold to some of our planters during the early part of this season and we exercised every energy to put a stop to this as soon as we found it out. A full report of this is given in Bulletin No. 113. A planter using such a recipe is bound to be disappointed in the results obtained, besides being deprived of his money. Frauds of this nature would no doubt be practiced extensively were it not for our fertilizer law.

PARIS GREEN.

The past season forty samples of Paris green were received and analyzed and all of them ran above the guarantee of 50 per cent arsenious oxide, as required by our law. It is a source of satisfaction to know that the Paris green shipments inspected this past season have all been of good quality. These samples average 55.85 per cent of arsenious oxide.

COMMERCIAL FEEDING STUFFS.

	1905-06.	1906-07.	1907-08.
Cotton seed meal	588	749	823
Rice bran	177	343	312
Rice polish	...	142	151
Wheat products	74	1,402	1,705
Molasses feeds	330	442	861
Corn chops	...	2,101	3,134
Corn and oat feeds	543	749	640
Feed mixtures	...	...	357
Hominy feeds	...	42	55
Feed meals	...	65	68
Brewers' grains	29	46	87
Poultry feeds	4	323	357
Miscellaneous	70	65	65
Total analyses	1,815	6,469	8,615

The number of samples of feed stuffs received during the past season has been greater than ever before. There is a great deal of competition between the several manufacturers of commercial feeds and this condition has helped to bring about a general improvement in the quality of our feeds. The manufacturers are beginning not only to think of meeting the guarantee, but they are also endeavoring to put out feeds that will have a good effect on the animals to which they are fed. It is not unusual for a manufacturer to change the composition of his feed to bring about such improvement.

Since the passage and enforcement of the feed stuff law there has been a wonderful improvement in the commercial feeds sold in the State. It has necessitated the discontinuance of the sale of many inferior feeds formerly common to our market. On the whole Louisiana is now receiving better commercial feeds than most any State in the Union.

MISCELLANEOUS ANALYSES.

This laboratory is always glad to analyze soils, waters, fertilizers, feed stuffs, ores, insecticides and other materials, free of charge, when such work does not interfere with the official work. The official work includes the analyses of fertilizers, feed stuffs and Paris green collected by the official inspectors, and this work is always given preference. The past season several samples of soils, waters, ores, insecticides, feed stuffs, fertilizers, etc., were examined.

GENERAL REMARKS.

It is our aim in all of our work to get the results to the purchaser and the manufacturer as soon as possible. Our success in this is partly shown when you consider that we made 2,263 analyses of feed stuffs covering 8,615 shipments.

In the number of feed stuff analyses made, we surpass all other laboratories charged with such work.

We handle more samples of fertilizers and feed stuffs than any other laboratory in this country, and, as far as we know, we perform more work per man than any laboratory doing such work. The analyses of this laboratory are frequently used as a basis for settling disputes between commercial chemists, and it enjoys the confidence of both the planters and the manufacturers. Contracts for payment of feeds and fertilizers are frequently made on the results of our work.

A new apparatus for extracting fat has been installed and it has enabled us to do more work on feed stuffs than formerly. Other laboratory equipment has been improved, to increase the efficiency of the work.

Respectfully,

J. E. Halligan,

Chemist in Charge of Feed Stuff, Fertilizer and Paris Green Laboratories.

STATION NUMBER THREE.

North Louisiana Station.

Major J. G. Lee has been in charge of the work at Calhoun during the past year. On account of poor health his resignation was tendered, to take effect the last of December, 1908, and

Mr. J. B. Garrett was appointed assistant director for this station. Major Lee's valuable services in agricultural lines are well known over the State, and it is a great misfortune to this interest to have his work interrupted. However, Major Lee is yet a young man, and we shall hope to see him grow strong and re-enter the work of advancing the agricultural development of Louisiana, as he is eminently qualified by temperament, training and experience for this work.

Mr. Garrett is a graduate of this University, has been identified with agricultural investigations of the Crop Pest Commission and of the Experiment Station for several years, and acted one year as assistant director of the Calhoun station, during the absence on leave of Major Lee. He is well qualified to take up the work there, and he has the hearty support of all who know him.

CATTLE FEEDING EXPERIMENTS.

The results of feeding experiments in which ensilage and cotton seed meal, as compared with cotton seed hulls and meal, were used for the production of beef, have been continued. Twelve steers were fed in 1907-08, and sixteen head are now ready for market. We have the results of three years' experiments about ready for publication. The practicability of keeping silage in perfect condition has been fully demonstrated.

ROTATION EXPERIMENTS.

The rotation experiments have been continued. Bulletin No. 111 gives the results of these experiments for a long series of years. These results should be of inestimable value to the farmers of the State.

COTTON.

Considerable attention has been given to testing early varieties of cotton, under boll weevil conditions, on larger areas than usually used for experiments of this kind. The early varieties all made fairly good yields, while ordinary varieties produced only about half as much. Hawkins Extra Early Prolific, Toole's and Pullnot, all produced nearly a bale per acre, on hill land. King's was somewhat inferior to the above named varieties.

The results demonstrate the possibility of raising fairly good crops, by proper cultivation, fertilization and selection of varieties, under average conditions with boll weevil infestation.

CORN.

Besides continuing variety and fertilizer tests on corn. special attention has been given to cultural methods in corn production. The Williamson method of raising corn has again been tested with results that were not very favorable to the method.

PEANUTS.

More extensive experiments have been carried on with peanuts and several new varieties were secured from the Division of Seed and Plant Introduction of the National Department of Agriculture. Plans have been consummated whereby we are to co-operate with the National Department in testing the possibility of producing peanuts on a large scale for oil production.

SUGAR CANE EXPERIMENTS.

Experiments for determining the influence of different fertilizers on the color and quality as well as quantity of syrup and sugar cane on the hill lands has been continued. This work has already resulted in securing some very valuable data. but it is considered best to secure the results of several years of verification before publishing the same. We believe, however, that by proper fertilization. the hill lands of North Louisiana of average quality can be made fairly profitable in the production of cane syrup, whereas the growing of cane has heretofore been limited almost entirely to small areas of bottom land along the branches and small streams.

STATION CATTLE.

Since the organization of the station there has been a Jersey herd of cattle kept here and a dairy has been maintained. but so much trouble has been experienced in keeping a satisfactory dairyman and the farmers seemed to take such little interest in this enterprise that it was deemed best to remove the dairy herd to the dairy of the State University at Baton Rouge. and take up some work with the beef types here. We now have ten good grade Red Polled heifers and expect to breed them to a pure Red Polled bull and continue to improve the herd in that way.

SHEEP.

We have a nice flock of ewes, which have been bred to a pure bred Southdown ram and we will continue to grade them up until we have a first-class herd of mutton producers to work with. Sheep are easily kept and there is no reason why every farmer in this section of the State should not have a small flock on his farm to help utilize waste products and return a handsome profit for the little attention which they require. We are going to carry on several experiments during this year to ascertain the most economical methods of maintaining and rearing sheep in this section of the State, and hope to get some valuable data along that line.

HOGS.

The farmers throughout the State, and more especially in North Louisiana, are devoting more time and attention to the raising of hogs than ever before, and many of them are asking for information concerning the breeds, the best and most economical crops to grow for the production of pork, the best methods for raising and caring for pigs, and what profits may be expected if the most economical methods are employed. To get sufficient data on all of these points will require a good deal of time and work, but we have planned a number of experiments which, when completed, will furnish us with all of the necessary information along this line.

CREOSOTING EXPERIMENTS.

There has been such a great demand for all kinds of timber for the past few years that the forests have become almost depleted of the fine hardwood trees from which the best fence-posts were formerly made, and it is now necessary to find some kind of substitute to take the place of these timbers for fencing purposes. With that idea in view, this station conducted, in co-operation with the United States Department of Agriculture, Forest Service, some experiments in creosoting loblolly pine, bay, sweet gum, black gum, tupelo gum, and cypress.

The posts were cut, the bark removed and then dried before being subjected to the treatment. One thousand posts in all were treated and they were divided into several lots, each lot being treated for a different length of time, and then a label was placed on each post in order that it will be no trouble to locate them at any time. About one-half of these posts have already been set in the ground on the station, and good, substantial woven-wire fences have been erected, so with these posts and that kind of fencing we should not have much trouble with the fencing proposition in the near future.

DAIRY WORK.

The herd of dairy cattle which have for many years been kept at this station have been removed to the State Experiment Station, Baton Rouge, where the facilities are broader and better for all phases of dairy work which are suitable for investigation the results of which will lead to an improvement in the dairy herds of the State.

HORTICULTURAL WORK.

During the past season no extensive work along horticultural lines was undertaken, except to maintain the orchard and nursery stock, previously planted. During a considerable portion of the time we had no horticultural specialist on the station staff at Calhoun. Mr. E. J. Watson, former horticulturist of the station, returned, however, in August, and has since given his time to the inauguration of some new lines of work that will be prosecuted in the future. Among the experiments planned, on peaches, is a series of tests (1) for determining the influence of phosphoric acid and potash on the flavor and shipping qualities of peaches. (2) Comparison of the different methods of cultivation and summer cropping of the peach orchard. (3) Spraying for the control of fungus diseases. (4) Spraying, whereby to retard the blooming. (5) Continuation of the work of selecting seedling peach trees with a view of hybridizing for the production of special characters which we hope to be able to combine.

The work on grapes and plums will be a continuance of the work already outlined in previous reports.

IRISH POTATOES.

We have planned some extensive experiments looking to the development of better methods of handling and preserving the early crop of potatoes and of securing better seed for planting the fall crop. The results already secured lead us to believe that a way can be found of securing much larger yields of fall potatoes than have previously been possible under ordinary conditions. We shall also have in mind the possibility of developing a strain of potatoes that will have much better keeping qualities than any of the varieties now grown.

Financial Statement.

(Receipts and disbursements of all funds.)

The following is a copy of the statement already rendered to the Federal authorities, showing the receipts and expenditures of the Hatch Fund and the Adams Fund for the year ending June 30, 1908:

HATCH AND ADAMS FUNDS.

DR.

		Hatch Fund.	Adams Fund.
To receipts from the Treasurer of the United States, as per appropriations for fiscal year ended June 30, 1908, under acts of Congress, approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)		$15,000.00	$9,000.00

CR.

	Abstract.		
By Salaries	1	$14,982.02	$7,045.15
Labor	2	......	99.84
Postage and stationery	4	2.98	1.80
Freight and express	5	......	54.33
Heat, light, water and power	6	......	164.60
Chemical supplies	7	......	634.82
Seeds, plants and sundry supplies	8	......	14.80
Feeding stuffs	10	......	60.75
Library	11	......	246.56
Tools, implements and machinery	12	......	.25
Furniture and fixtures	13	......	7.00
Scientific apparatus	14	......	253.34
Live stock	15	......	100.65
Traveling expenses	16	......	263.90
Contingent expenses	17	15.00	10.00
Buildings and land	18	......	42.21
Total		$15,000.00	$9,000.00

We, the undersigned members of the State Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the fiscal year ending June 30, 1908, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000 for the Hatch Fund, and $9,000 for the Adams Fund, and the corresponding disbursements are $15,000 for the Hatch Fund and $9,000 for the Adams Fund, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed)

CHAS. SCHULER,
Commissioner of Agriculture and Immigration.

HENRY FUQUA,
Vice President Board of Supervisors of the Louisiana State University and Agricultural and Mechanical College, and Ex-Officio Member of the State Board of Agriculture.

The following is a combined statement of the receipts and expenditures from December 1, 1907, to November 30, 1908, of funds other than those secured through Federal appropriations, statements covering same having been reported to the State Auditor after the accounts and vouchers for the above period had been examined and found correct by Mr. Henry Fuqua, Vice President of the Board of Supervisors of the Louisiana State University:

STATE FUND.

DR.

Cash on hand, Dec. 1, 1907	$ 6,460.50
Received from the State Treasurer	6,500.00
Received from the State Treasurer (through the Commissioner of Agriculture), Fertilizer and Feed Stuffs Fund	*3,000.00
Received from miscellaneous sales, etc.	4,444.66
Transferred from the Fertilizer Fund	*10,500.00
Total	$30,905.16

CR.

Salaries	$ 1,894.65	
Labor	8,089.83	
Publications	3,331,94	
Postage and stationery	747.63	
Freight and express	836.39	
Heat, light and water	702.67	
Chemical supplies	437.64	
Seeds, plants and sundry supplies	1,719.13	
Fertilizers	413.98	
Feeding stuffs	1,714.04	
Library	286.72	
Tools, implements and machinery	989.31	
Furniture and fixtures	441.21	
Scientific apparatus	821.99	
Live stock	2,102.84	
Traveling expenses	963.32	
Contingent expenses	1,251.97	
Building and repairs	3,210.26	
Rent	147.50	
Exhibits	343.16	
Total	$30,446.18	Total Receipts
Cash on hand Nov. 30, 1908	458.98	
	$30,905.16	$30,905.16

---

*See Fertilizer, Feed Stuffs and Paris Green Fund Statement.

FERTILIZER, FEED STUFFS AND PARIS GREEN FUND.

DR.

Cash on hand, Dec. 1, 1907	$ 2,646.63
Received from the State Treasurer (through the Commissioner of Agriculture)	31.174.80
Received from miscellaneous sources	146.36
Total	$33.967.79

CR.

Transferred to account of Experiment Stations, State Fund	*$10,500.00	
Transferred to account of Experiment Station, State Fund	*3,000.00	
Salaries	10,850.35	
Publications	2,573.15	
Labor	1,121.29	
Postage and stationery	327.14	
Freight and express	293.49	
Heat, water and light	64.78	
Chemical supplies	1,197.71	
Seeds, plants and sundry supplies	341.17	
Fertilizers	64.21	
Feeding stuffs	149.01	
Library	235.10	
Tools, implements and machinery	272.34	
Furniture and fixtures	174.20	
Scientific apparatus	613.14	
Live stock	2.00	
Traveling expenses	488.31	
Contingent expenses	336.60	
Building and repairs	89.03	
Exhibits	23.75	
Total	$32,716.77	Total Receipts
Cash on hand Nov. 30, 1908	1,251.02	
	$33,967.79	$33,967.79

---

*See State Fund Statement. Transferred from Fertilizer, Feed Stuffs and Paris Green account, surplus after paying expenses of analytical laboratory, $13,500. This amount shows as a receipt on both Fertilizer and State Fund books, when as a matter of fact the above sum was transferred from the Fertilizer, Feed Stuffs and Paris Green account to that of the State Fund account.

GEOLOGICAL SURVEY FUND.

DR.

Cash on hand Dec. 1, 1907	$ 387.94
Received from the State Treasurer	3,000.00
Total	$ 3,387.94

CR.

		Total Receipts
Salaries	$ 1,435.86	
Labor	5.70	
Publications	369.30	
Postage and stationery	16.52	
Freight and express	32.07	
Seeds, plants, etc	16.35	
Library	41.09	
Field expenses	743.30	
Total	$ 2,659.39	
Cash on hand Dec. 1, 1908	728.55	
	$3,387.94	$3,387.94

Available Bulletins.

The following is a list of the available bulletins of the Experiment Stations, and requests for these publications should be addressed to the Baton Rouge Station:

Bulletin No. 5—Sugar Making on a Small Scale.

Bulletin No. 67—Broom Corn, How to Grow and Cure It.

Bulletin No. 68—Home Grown vs. Purchased Seed.

Bulletin No. 69—Pecans and Pecan Culture.

Bulletin No. 70—Cane Borer *(Diatroea Saccharalis)*.

Bulletin No. 71—Report of North Louisiana Experiment Station, 1901.

Bulletin No. 73—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 74—Sheep: Different Breeds, Internal Parasitic Diseases, Etc.

Bulletin No. 75—Preservation of Cane Syrups, and Yeasts. Moulds, Bacteria and Enzymes.

Bulletin No. 76—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 77—Rice.

Bulletin No. 78—Comparative Results of Seedling Sugar Canes, D. 74 and D. 95, with Our Home Sugar Canes (Louisiana Striped and Louisiana Purple).

Bulletin No. 79—Results of Experiments with Nodule Diseases of the Intestines of Sheep.

Bulletin No. 80—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 82—The Texas Fever Cattle Tick Situation, and the Eradication of the Tick by a Pasture Rotation System.

Bulletin No. 83—Results of Further Experiments with Nodule Diseases of Sheep; Bare-Lot Method of Raising Lambs.

Bulletin No. 84—Texas Fever.

Bulletin No. 85—Black Leg.

Bulletin No. 86—Our Available Stock Foods.

Bulletin No. 87—Analyses of Commercial Fertilizers and Paris Green..

Bulletin No. 88—Commercial Feeding Stuffs.

Bulletin No. 89—Nodule Diseases of Intestines of Sheep; Bare-Lot Method of Raising Lambs.

Bulletin No. 90—Vegetables and Fruits.

Bulletin No. 91—Chemistry of Sugar Cane and its Products in Louisiana.

Bulletin No. 93—Second Report on the Horseflies of Louisiana.

Bulletin No. 94—Effects on the Human System of Louisiana Manufactured Syrups and Molasses.

Bulletin No. 95—Diseases of Lambs and Sheep; Bare-Lot vs Grass-Lot.

Bulletin No. 96—Cotton Wilt.

Bulletin No. 97—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 98—Commercial Feeding Stuffs.

Bulletin No. 99—Japanese Persimmons.

Bulletin No. 100—The Root Disease of Sugar Cane.

Bulletin No. 101—The Diseases of Pepper and Beans.

Bulletin No. 102—Dairy Herds and Their Milk Production, Hammond, La.

Bulletin No. 103—Sulphur and Its Combinations in the Sugar House.

Bulletin No. 104—Feeding Blackstrap Molasses to Young Calves.

Bulletin No. 105—Diseases Affecting Rice in Louisiana.

Bulletin No. 106—Cerebro-Spinal Meningitis of Horses.

Bulletin No. 107—Preliminary Tests of Sugar House Machinery.

Bulletin No. 108—A Preliminary Report on Some Diseases of Chickens.

Bulletin No. 109—Experiments with Bacterium Anthracis, Anthrax Vaccines and Hyperimmunization.

Bulletin No. 110—Comparison of Cotton Seed Meal and Hulls with Cold Pressed Cake as a Dairy Feed.

Bulletin No. 112—Orchard Report of Baton Rouge Station.

Bulletin No. 113—Analyses of Commercial Fertilizers and Paris Green.

Bulletin No. 114—Analyses of Commercial Feeding Stuffs.

Circular on Anthrax or Charbon (by Dr. W. H. Dalrymple, M. R. C. V. S.).

Circular—A Few Facts on the Production of Swine in Louisiana.

TWENTY-SECOND ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

Agricultural & Mechanical College
FOR 1909.

TO THE GOVERNOR

By W. R. DODSON, Director.

BATON ROUGE
THE NEW ADVOCATE, OFFICIAL JOURNAL
1910

TWENTY-SECOND ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University

AND

Agricultural & Mechanical College
FOR 1909.

TO THE GOVERNOR

By W. R. DODSON, Director.

BATON ROUGE
THE NEW ADVOCATE, OFFICIAL JOURNAL
1910

B 23 1913

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration.

EX-OFFICIO.

GOVERNOR JARED Y. SANDERS, *President.*
HENRY L. FUQUA, *Vice-President of Board of Supervisors.*
CHAS. SCHULER, *Commissioner of Agriculture and Immigration.*
THOMAS D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS.

Henry Gerac, Lafayette.
John T. Cole, Monroe.
John J. Henderson, Lagan.
R. E. Thompson, Wilson.
Jeff D. Marks, Crowley.

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
HAMILTON P. AGEE, B. S., Assistant Director, Audubon Park, New Orleans.
S. E. McCLENDON, B. S., Assistant Director, Calhoun.
FRIEND C. QUEREAU, B. S., Ass't Director Rice Exp'ment Station, Crowley.
W. G. TAGGART, B. S., Assistant Chemist, Audubon Park, New Orleans.
WM. G. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
J. K. McHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
J. E. HALLIGAN, B. S., Chemist, Baton Rouge.
H. L. GREEN, B. S., Assistant Chemist, Baton Rouge.
A. P. KERR, B. S., Assistant Chemist, Baton Rouge.
R. BAUS, B. S., Assistant Chemist, Baton Rouge.
R. G. FULLER, B. S., Assistant Chemist, Baton Rouge.
R. G. TILLERY, B. S., Assistant Chemist, Baton Rouge.
P. H. DOHERTY, B. S., Assistant Chemist, Baton Rouge.
ROGER P. SWIRE, A. B., Treasurer, Baton Rouge.
J. B. GARRETT, B. S., Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
E. W. KERR, M. E., Professor Mechanical Engineering, Baton Rouge.
T. C. PAULSEN, B. S., M. D. C., Assistant Veterinarian and Bacteriologist.
J. T. TANNER, A. B., Secretary and Stenographer, Baton Rouge.
IVY WATSON, Farm Manager, Calhoun.
E. J. WATSON, Horticulturist, Calhoun.
SAM'L FRYE, in charge of Dairy, Baton Rouge.
V. L. ROY, B. S., in charge of Boys' Demonstration Work.

Louisiana State University

AND

Agricultural and Mechanical College.

OFFICE OF EXPERIMENT STATIONS,
Baton Rouge, La., Feb. 1, 1910.

To His Excellency, JARED Y. SANDERS, *Governor of Louisiana.*

SIR: In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 16, 1906, known as the Adams Act, providing for federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1909, and a financial statement for the government fiscal year, July 1, 1908, to July 1, 1909.

While the receipts and expenditures of the various funds received from the State of Louisana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of federal funds, so as to show the total receipts and expenditures for twelve months.

Respectfully,
W. R. DODSON,
Dean and Director.

STATION NO. 1.

SUGAR EXPERIMENT STATION.

AUDUBON PARK, NEW ORLEANS.

Mr. H. P. Agee, Assistant Director, in charge of this station, has performed his duties faithfully. Much of the work of the year has been a continuation of what has been outlined in previous reports. Much valuable data has been added to that previously obtained. The more important phases of work are briefly discussed herein under appropriate headings.

Sugar Cane Seedlings.

My last report outlined the method of securing seedlings of sugar cane. We were much encouraged by the success achieved in 1907-8, and during 1908-9 we secured seed from a much wider geographical range. These seed were again entrusted to Mr. A. E. Weller, of the Horticultural Hall, Audubon Park, who was the first party to succeed in germinating sugar cane seed in this country. For kind assistance in this work, in sending us seed, we are indebted to Mr. Francis Watts, Government Chemist and Superintendent of Agriculture of Antigua, B. W. I.; Mr. J. C. Waldron, Antigua, B. W. I.; Mr. Noel Deerr, Acting Director, Sugar Experiment Station, Honolulu, T. H.; Mr. D. W. May, special agent in charge of Experiment Station, Mayaguez, P. R.; Mr. J. T. Crowley, Director Estracion Central Agronomica, Santiage de las Vegas, Cuba; Mr. John R. Bovel, Superintendent Department of Agriculture, Bridgetown, Barbados, B. W. I.; Mr. F. Evans, Acting Superintendent, Port of Spain, Trinidad; Mr. David Fairchild, Bureau of Plant Industry; Mr. Robert M. Grey, Harvard Botanical Station, Cienfuegos, Cuba; Department of Agriculture, Jamaica, B. W. I.; Department of Agriculture, Trinidad, B. W. I.; Director Treub, Buitzenzorg, Java, and Colonial Sugar Refining Co., Ltd., Sydney, New South Wales.

We were able to make laboratory tests this year of the new seedlings secured in 1908. Out of this number four were superior in sugar content to the celebrated seedling D. 74. The Louisiana seedling, No. 92, that surpassed D. 74 last year, fell below it this season in sugar content, but it may regain its position another year. It seems reasonable to expect the discovery of a cane that will be superior to the canes now cultivated, if we persist long enough in this work.

CHEMICAL DEPARTMENT.

Work in chemistry falls into three classes. First, that which is necessary to determine the sugar content and purity of the juices from cane for the field experiments, such as fertilizer tests, variety tests, merits of seedlings, etc., and the analyses necessary for the control of the sugar house. Many hundreds of analyses of this kind have been made during the past year. Second, miscellaneous analyses for the public, including analyses of sugar cane products, soils, waters, etc. One hundred and eighty-seven analyses of this character have been made during 1909. Many requests for analysis have to be declined, as they are of private character and should be referred to commercial chemists. Mr. J. A. Hall and Mr. A. B. Joffrion were employed for the grinding season to assist in this work. Mr. R. E. Graham was engaged in this work until he was assigned to field work. Third, analyses connected with purely scientific research. Dr. P. A. Yoder and Mr. W. G. Taggart have had charge of this work. Time has been devoted primarily to a study of the minor constituents of sugar cane and its products. The organic acids have received most attention. It was found that the methods of determining some of these acids had been worked out for wine and fruit juices only, and were not sufficiently accurate when applied to cane juices. Some progress has been made in improving these methods. Specialists tell us that we have advanced about as far as we may expect to in our methods of handling cane juices, either for sugar or syrup, until we know more of these minor constituents. Progress in this kind of research is necessarily slow. Several years' work may be necessary before much that is helpful is obtained, and it is possible that we may not find immediate application for the knowledge gained of these things.

Some work has also been done on formaldehyde in sugar products, and methods of its detection and determination.

Some analyses have also been made in work in co-operation with the bacteriological laboratory in determining the nature and amount of fermentation products from cane juices and sugars.

Some time has also been given to work referred to this laboratory by the official association of American agricultural chemists.

SUGAR TRADE LABORATORY.

The station has realized the need of a laboratory in which all sugars sold by polarization could be polarized by disinterested parties. New York established such a laboratory in 1907, and it has met with much favor. The matter was presented to the Sugar Planters' Association by Mr. Agee and Mr. Hall, in exhaustive papers on the subject. It is hoped that the sugar trade will make provision for such a laboratory in New Orleans. The Experiment Station has offered its services as referee in cases of disagreement between the polarization of the chemists of buyers and sellers, until a referee laboratory may be established at the expense of the trade.

BACTERIOLOGICAL DEPARTMENT.

The bacteriological work outlined in my last report as planned for has been prosecuted throughout the year by Mr. W. L. Owen. We believe the data secured will be of material aid in working out plans to reduce the losses from inversion in stored sugars, and from fermentation during the process of manufacture. The bacteriological flora of yellow clarified and low-grade sugars of Louisiana, and other sugar countries sending sugar into the United States, has been fairly well determined. The number of species of organisms capable of inverting sugar is comparatively small in Louisiana. These species are being carefully studied as to their morphological and physiological characters. Study is being made of the conditions that predispose sugars to fermentation. For instance, careful determinations are being made of the influence of moisture and reducing sugars on bacterial inversion.

In order to determine the persistence of inverting species of bacteria in the sugar house, cultures were made from the raw and clarified juices, the syrups, masquitte sugars and molasses of ten runs during the grinding season, at the Experiment Station sugar house. It was evident that many of the organisms in the raw juice survived the entire milling process and formed a considerable part of the bacterial flora of the finished sugar. Another year this work will be repeated under conditions calculated to destroy these organisms more completely, as might be the case where superheating the juice is practiced, or where formaldehyde is used in the juice.

In connection with this work a number of the most active yeasts and moulds is being collected and studied. While these do not seem to be of great importance in the inversion of dried sugars, we will have use for all obtainable knowledge of these when we begin the manufacture of denatured alcohol.

This department rendered service to some members of the Referee Board in securing data that would bear on the application of the national pure food law to the use of sulphur as a clarifying agent in the sugar house by running fermentation tests on sulphured juices, showing that the sulphur is used as a clarifying agent only, as it is not effective as a preservative against fermentation.

ENTOMOLOGICAL WORK.

Arrangements have been made by the Bureau of Entomology of the United States Department of Agriculture to establish on the station grounds their headquarters for *Investigations on Insects Injurious to Sugar Cane and Rice.* A laboratory will be established in a portion of one of the station buildings, and such other facilities as the station may afford will be offered. The Bureau will bear the entire expense of these investigations. The work will be under the direct charge of Mr. D. L. Van Dine, who was for eight years entomologist of the Federal Experiment Station of Hawaii. Mr. T. C. Barber will assist in this work. We will thus be relieved, to a large extent, of expense of conducting investigations that are becoming imperative, and to which we have already devoted considerable time.

FIELD WORK.

The various lines of work in the field previously reported have been continued. With most of this work it is necessary to get results for a long series of years to enable one to deduct the most reliable conclusions. The fertilizer experiments with cane will be enlarged, in an effort to eliminate variables made evident in previous work.

We now have over a thousand canes, of different origin, on the station. A very large per cent of these are new seedlings, as previously referred to. It is probable that most of them will have to be discarded as inferior when put under field test. Many cuttings of these canes have been sent in response to requests to various countries, covering almost the entire cane sugar producing world.

Forage and fiber crops have received some attention at this station, as has also truck gardening, but the work has been more in the way of testing varieties and no scientific work has been undertaken.

DEMARARA SEEDLING CANE NO. 74.

This cane, which was introduced by the Experiment Station, was damaged to an apparently serious extent by the hurricane of September 20, 1909. This station sent members of the staff to a number of plantations to determine by accurate counts the extent of the damage. The results of these investigations were published at the time in the agricultural papers. The damage was much less than had been supposed. For a while it looked like D. 74 had lost its popularity, but before the grinding season was over it was apparent that the estimate of damage to D. 74 was excessive, and the less apparent damage to the home canes was greater than estimated, so that the D. 74 gave, as usual, a larger sugar yield per acre than the home canes, and this seedling is probably more popular today than it has ever been.

THE SUGAR HOUSE.

The Experiment Station sugar house has been a good investment for the sugar planters, some of whom subscribed the funds for its original equipment. However, it is now in dire need of extensive repairs, and the installation of modern machinery. The boilers that have furnished the power for the sugar house since its establishment, are two that were installed for the machinery building of the New Orleans Exposition in 1884. They have recently been condemned, and we will not be permitted to use them again. New pumps are also necessary. Extensive improvements will be necessary if the station is to continue its sugar house investigations, and the sugar students of the university are to secure from it their practical experience in sugar-house operation.

We have put the sugar house at the disposal of several inventors, who seemed to have devices of merit, for the purpose of testing the efficiency of their apparatus in sugar-house work. Of these, the following are worthy of mention: Mr. Miguel Esnard has devised a method of accomplishing centrifugal filtration. The inventor proposes to make his apparatus take the place or clarifiers, settling tanks and filter presses. He seems to have largely overcome the previous objections to centrifugal filtration.

A new design of water weigher was installed at the expense of the inventors, Wilcox Engineering Company, for the purpose of testing its adaptability to use in the sugar house.

During the early part of the season a preliminary test of Barrios patent process of clarification was made, but the work was not completed, as the inventors were called to a sugar plantation to make a test on a large scale.

CANE HARVESTERS.

During 1909 four inventors were at work in New Orleans on cane harvesting machines. Much improvement was made over the machines of 1908, but the prostrated canes offered unusual difficulties to successful work of the harvesters. This work has partly been carried out at the station, as we have been glad to assist so worthy an effort. It now begins to look like we may have a successful cane harvester before long.

AUDUBON SUGAR SCHOOL.

The facilities of the station sugar house and laboratories have again been at the service of the students of the Audubon Sugar School. The students were under the constant supervision of an instructor from the university, and good work was done by them.

PLANTERS' MEETING AT THE STATION.

We are probably now justified in considering an annual meeting of the Sugar Planters' Association on the grounds of the station as an extablished programme. The second meeting of this kind was held in June, 1909, and was even a greater success than the first one. The following is taken from one of the journals giving an account of the meeting:

"Thursday, June 10, will go down as a red-letter day in the annals of the Louisiana Sugar Planters' Association, for then was held the second annual field day affair of the Association, as inaugurated June, 1908, by the new president, Mr. Charles V. Moore, in the nature of an experiment, to determine whether the sugar planters of the state would welcome such as innovation. So pronounced was the success of the meeting last June, when scores of planters, their managers and overseers and others interested in the sugar industry attended, that it was seen the field day event was to be firmly established as an annual institution of the Association, but none could foresee the enthusiasm with which the planters and others interested would take to the meeting this month, when fully one hundred visitors came in from the parishes and about half as many again that were present who live in New Orleans."

STATION No. TWO.

STATE STATION.

BATON ROUGE.

The office of the director and the laboratory for analysis of feed stuffs, fertilizers and Paris green for the State Board of Agriculture and Immigration are maintaineid on the University campus, in the Experiment Station building. The work has been carried on under the various departments as hereafter described.

FARM DEPARTMENT.

The field work has been continued under Mr. S. E. McClendon, Assistant Director. The results from fertilizer tests as applied to corn, cotton, oats and root crops have been added to our cumulative data on these topics. Variety tests of standard crops have been continued.

Root Crops.

Increased areas have been devoted to experiments in growing root crops during the winter for stock feed with good results. Stock carrots, mangel wurtzels, turnips, and rutabagas have given good yields planted after corn and cotton stalks are destroyed in early fall. These crops are destined to be of great importance to diversified agriculture in Louisiana. A bulletin will soon be issued giving the results of this work.

FIBRE CROPS.

There is renewed interest in *ramie,* and we sent approximately a ton of ramie stalks to various inventors, for trial runs of decorticating machines. We have also distributed roots for propagation, so the plant can be grown in various soils in the state. If a machine is perfected for removing and cleaning the fibre, Louisiana will probably afford the most favorable soil and climate for the profitable growing of this fibre, and it is my opinion that the plant will be extensively cultivated. The roots are perennial and the stalks may be harvested with a mowing machine and hay rake.

Flax sown in the winter has given a good crop again. We expect to enlarge experiments with this plant.

Special strains of *jute* secured from the National Department of Agriculture have been grown the past season with usual good yields. The cost of handling this fibre has precluded its cultivation.

Other fibre crops have also been grown that are of less promise.

FORAGE CROPS.

A large number of forage crops have been grown, including almost the entire list of forage plants that can be grown successfully in this latitude. Special attention has been given to *soy beans.* This work has been done in co-operation with the National Department of Agriculture, as they secured the seeds from all nations that grow this crop. I regret that results do not indicate that soy bean culture will be very profitable in Louisiana. This subject will be treated at length in bulletin form, when the experiments seem to justify definite conclusions.

We have made special efforts to learn how to grow alfalfa on hill lands but have not yet been successful. The Bureau of Plant Industry of the United States Department of Agriculture has furnished us with varieties from nearly all countries where alfalfa is grown. Peruvian alfalfa has shown conspicuous superiority to other strains, and it is hoped that this strain of seed can be secured in commercial quantities before many years.

In co-operation with the National Department of Agriculture we have secured a large number of species of *bur clover,* which thrives on upland, and this work promises good results.

The *hog grazing experiments* carried on during the past year have given gratifying results, which will be published in bulletin form.

We have on the farm at present about fifty head of *sheep,* having lost no lambs this year from stomach and intestinal worms.

The *silo* has again proven perfectly satisfactory.

DEPARTMENT OF MECHANICAL ENGINEERING.

During the spring of 1909 arrangements were made by which sugar-house engineering problems were approved as proper research work under the Adams Fund of the National Grant for Agricultural Research, and this department became a part of the permanent plans of the Experiment Station work. Professor E. W. Kerr, who had already done excellent work in this line for the stations, was therefore able to make more elaborate plans, and arrangements were made so that he could spend half of his time in this work, and half of his time in teaching, the stations paying half of his salary. Mr. E. M. Percy again assisted in this work. The work for 1909 consisted in developing the data secured during the grinding season of 1908, and the publication of this data in bulletin form, and the further experiments with bagasse burners during the grinding season of 1909. This data will be worked up and published during the spring and summer of this year.

The work covers the observations on some twenty boiler tests, in which the feed water was weighed, the amount of bagasse consumed measured, and the temperatures of furnace and stack taken and analyses made of the flue gases and so forth, with varying feed and air supply, with different types of furnaces. The results of this work will bring about a great economy in the fuel of the sugar houses, I am sure.

DEPARTMENT OF PLANT PATHOLOGY.

Dr. C. W. Edgerton has continued the work outlined in the report of last year, with the result that some of the phases of these problems have been elucidated, and new work inaugurated. Special attention has been given to the *pod spot* of the bean, and Bulletin No. 116, giving a preliminary report on this disease was published in June, for the benefit of those who wished to avail themselves of the information obtained in the production of a fall supply of seed free from the disease. The technical bulletin on this subject is now ready for the press, and is only awaiting sufficient funds in the treasury for its publication. The work on this disease should be of exceeding value to the bean growers. Losses have heretofore been very heavy during seasons favorable for the growth of the fungus, and it will now be possible to reduce the damage from the pod spot to a very small amount.

Cotton boll rots have also been studied, and important scientific data obtained on this subject. Special attention has been given to the infection through the flowers, and the presence of the disease in the seed. While we have little to suggest in the way of remedies as yet, distinct progress has been made in the knowledge of the organisms producing boll rot, and no doubt some remedial measures will be developed on this information.

A paper entitled ''The Perfect Stage of the Cotton Anthracnose'' was published in the May number of the Mycologia.

Sclerotium wilt disease was very destructive the past season to several crops, including alfalfa, garden peppers, artichokes and some other truck crops. Some work was done on this disease, but no especially noteworthy results were secured. Other diseases have been studied as opportunity and time would permit.

Alfalfa has received special attention during the past summer. This crop would be much more extensively grown were it not so difficult to carry a stand through the summer. Investigations the past summer have shown that the loss of a stand may be due to a number of causes. An insect that girdles the stem at the surface of the ground, and a stem rot are among the important things that had not previously been known.

A large number of strains of alfalfa from different countries were secured through the co-operation of the U. S. Department of Agriculture for the purpose of testing their resistance to all the unfavorable conditions that may be met with here. Some of these strains have shown marked superiority to our common varieties. Unfortunately these seed cannot now be secured in commercial quantities, but it is likely that these experiments, if verified by more extended observations, will help to develop a supply of seed of the desirable kind.

HORTICULTURAL DEPARTMENT.

Mr. Geo. L. Tiebout has given one-half of his time to this work and one-half to teaching in the University. In the early part of the season a well equipped greenhouse was completed, at an expense of about six thousand dollars, twelve hundred of which was paid by the University. The west wing of the building is devoted to horticultural experiments, and the east wing to experimental work on plant diseases and insect propagation. The central section is intended for ornamental plants and types for laboratory service of the students of the University.

Greenhouse cucumbers have received special attention this winter, the work being mainly tests of varieties for greenhouse work in Louisiana.

In co-operation with the U. S. Department of Agriculture we are testing obtainable varieties of the chayote or vegetable pear, with the purpose of determining the best varieties for this climate, and then undertaking a propaganda for the popularization of the cultivation of the plant. A few people have cultivated these plants for many years in Louisiana, but it is not generally known. It is a vegetable of highly commendable qualities.

We are also working in co-operation with the U. S. Department of Agriculture in growing *Globe artichokes.* A number of varieties have been imported by the Division of Seed and Plant Introduction, and considerable seedling work is being done. At the price that prevails for this vegetable, a remunerative industry should be built up in Louisiana.

A considerable number of new citranges, orange hybrids, have been secured from the U. S. Department of Agriculture. The past year there was a fair crop of the older citranges produced, and the fruit made a refreshing drink of good quality. A few varieties of other new plants have been secured, but no noteworthy results have yet been secured.

The experiments on *general truck crops* have been very satisfactory and the results will be published in bulletin form when sufficient repetition has been obtained.

The general interest in trucking has greatly increased throughout the state, and there has been considerable demand for the horticulturist to visit different portions of the state to aid in the organization of truck growers' associations. Quite a number of trips have been made, the traveling expenses of which have been met by the Commissioner of Agriculture, as farmers' institute work.

DEPARTMENTS OF VETERINARY SCIENCE AND ANIMAL PATHOLOGY.

Work in these lines has been carried on by Dr. W. H. Dalrymple, assisted by Dr. T. C. Paulsen. The correspondence of the department has been very heavy and has been taken care of mainly by Dr. Dalrymple, while Dr. Paulsen has given his time to research work. Dr. Dalrymple has also devoted some of his time to research work with Dr. Paulsen in consultation and planning experimental work. Dr. Paulsen began his work in April, 1909, having spent all of the latter part of 1908 and the first three months of 1909 in post graduate study in the University of Pennsylvania, along the lines of research that he was to take up here.

This department has given special attention to further investigations on the subject of hyperimmunization of sheep to the anthrax organisms for the purpose of using the serum from these hyperimmunized animals to hasten the production of immunity of other animals through inoculation. This work involves considerable delays in waiting for the effects of the successive inoculations, and no results are yet ready for publication.

A great many tests of *anthrax vaccines* have been made. In general the results have shown that the vaccines to be obtained on the market are exceedingly unreliable, a very large per cent of them proving to be absolutely worthless. In a few instances they have shown sufficient virulence to be a source of danger. This work has greatly emphasized the necessity of either federal or state supervision of the preparation of vaccines of this kind.

The purchaser has no protection at the present time. Although the vaccine may have been made by a reputable house, it may become absolutely worthless from improper handling or from being held on the market too long. Thousands of animals in the southern part of the state would be saved every year if reliable vaccines could be had to meet all requirements. A great many specimens of blood from animals dying with symptoms of anthrax have been sent in and have been examined here for the benefit of the public. Probably one-half of these cases, or more, have proved to be genuine anthrax and we have been able to suggest measures for restricting the spread of the disease. Many other pathological specimens are sent in for examination by the department. Dr. Paulsen has also made several trips into various parts of the state for the purpose of investigating outbreaks of fatal diseases among cattle, and in several instances has found these losses to be due almost wholly to anthrax. We also had the misfortune of an outbreak of anthrax on the Experiment Station farm during the past year, from which we lost a number of valuable animals. At the time of the outbreak we did not know of the existence of any contagious or infectious disease in the vicinity, and, since there had been no anthrax here for about ten years, our animals had not been vaccinated to protect them. On making investigation for the possible source of infection we found that a number of animals had died in the vicinity and some in town, and the carcasses drawn to a region that drained into the Experiment Station grounds. We believe that these animals died with anthrax and that the infection was brought to the station either through drainage or through other means of contamination from the animals that were destroyed by the disease, no report of which was made to any public official. This experience emphasizes the necessity of providing some properly constituted authority to deal with outbreaks of contagious diseases in the state.

During the year only one serious outbreak of the so-called blind staggers was reported, and investigations on this outbreak added very little to our knowledge of this elusive disease.

A very serious, though local, outbreak of the intestinal disease of cattle occurred in one of the alluvial parishes, among a lot of cattle imported from Texas. This is a comparatively unknown disease in this state, and one about which very little is known and for which very little can be done. The owners of the herd in which this outbreak occurred were very energetic to stop the spread of the disease and were finally successful.

There have been a good number of cases of symptomatic anthrax or "black leg" reported to the station authorities, though losses from this cause have not been very heavy. This is a disease that is pretty well understood, and provision for its control would properly fall under the work of the State Livestock Sanitary Board.

There are frequent demands for the services of a veterinarian to investigate outbreaks of diseases that we are not able to meet.

ENTOMOLOGICAL DEPARTMENT.

Mr. Wilmon Newell has had charge of the entomological work of the stations, as well as that of the Crop Pest Commission. We have paid one-half of Mr. Newell's salary. He has made a study of the rice insects his special line of work for the year, particularly the rice maggot, the corn root worm, the rice grain weevil, and some of the insects that sting the grains while in the young stage. He has accumulated considerable helpful data on these insects. He has also conducted an experimental apiary and has handed me a bulletin covering the question of bee growing in Louisiana. I hope to be able to publish this some time during the coming summer. As noted elsewhere, the Bureau of Entomology of the U. S. Department of Agriculture has established a laboratory at the Sugar Station, and we will no doubt be able to secure some assistance for the study of rice insects, so that no provision has been made for Mr. Newell's successor for the present. Mr. Garrett, succeeding Mr. Newell as Secretary of the Crop Pest Commission, will devote all his time to the Crop Pest work.

THE DAIRY.

Mr. J. G. Lee, Jr., continued in charge of the dairy work until September first, when he resigned to take charge of the instruction in agriculture in the Southwest Louisiana Industrial Institute at Lafayette. On account of lack of funds to carry all the work undertaken the previous year, we have not employed a successor to Mr. Lee. This work has been entrusted to Mr. Samuel Frye, our efficient dairyman and herdsman. Experiments have been conducted to determine the food value of sweet potatoes and sweet potato vines, for milk production. Stock beets have also been fed under careful experiments. The results of this work have been prepared for publication.

The University Dairy was turned over to the stations on the first of July, 1909, and several hundred dollars were spent in equipping a milk room and providing machinery for chopping and grinding hay. Before the close of another year we will be well provided for conducting almost any kind of feeding tests that we may desire, under favorable conditions for keeping accurate records. If we had more cows the work could be carried on to greater satisfaction.

CORN CLUBS. AGRICULTURAL SCHOOLS.

The past year marks the definite organization of the corn club movement into a statewide effort. The Director assisted to some extent in 1908 in the organization of the first corn clubs, and delivered some twenty lectures on teaching agriculture in the public schools of Louisiana. In September, 1909, Professor Victor L. Roy, Parish Superintendent of Education of Avoyelles Parish, became a member of our staff, for the purpose of devoting his entire time to the work of promoting agricultural education. He has organized a large number of corn clubs and has been of great assistance to the ten agricultural schools that have been established in the state. One-third of his salary and expenses is paid by the U. S. Department of Agriculture, one-third by the Commissioner of Agriculture, and one-third by the Experiment Stations. Colonel Schuler has also furnished a good many corn clubs with seed corn. No agricultural work has been more enthusiastically received throughout the state. The police juries in a large number of parishes have appropriated money to help the work in their respective parishes. Public-spirited men have subscribed money for premiums for the best corn grown by members of the clubs. I know of no work that is calculated to produce a more wholesome effect on the agriculture of the state than that which is being done by Professor Roy and his supporters. Before the corn planting season of 1910 is over we believe he will have seven or eight thousand boys studying corn, and we hope to have ten thousand. Before the close of your administration we should have twenty thousand enlisted in this work.

The organization of agricultural schools no doubt will be epoch-making in the agricultural education of the state.

EXHIBIT AT THE STATE FAIR.

The Experiment Station again made an exhibit at the State Fair of the work being done, as far as this could be done without undue expense. A large number of photographs of crops, livestock and farm machinery were exhibited and samples of the rarer crops were exhibited. Graphic illustrations of the composition of feed stuffs, especially of forage and grain crops, were exhibited. Likewise, graphic illustrations of the amount of fertility removed from the soil by different farm crops and the amount of fertilizer required to restore this fertility. Where possible, tabulated statements regarding experiments were given. An exhibit of parasitic diseases of farm animals was made.

The exhibit no doubt did much good in acquainting the public with the nature and scope of the work of the stations.

FARMERS' INSTITUTES.

The Director and the various members of the staff have attended in all more than fifty farmers' meetings, and given addresses. In most instances the expenses of travel to these meetings has been paid by the Commissioner of Agriculture. There has been a demand for men to attend additional meetings that could not be met, owing to conflicting engagements. It is believed that more good is accomplished when the farmers voluntarily get together and call for a speaker than where the meetings are arranged by schedule and the farmers requested to attend. For this reason we have tried to meet all special requests, even though it has interfered at times with station work.

LABORATORY FOR THE ANALYSIS OF FEED STUFFS, FERTILIZERS AND PARIS GREEN.

This work has been continued under the immediate charge of Mr. J. E. Halligan, assisted by six chemists, the greater portion of the time. A comparatively small number of fertilizers and feed stuffs failed to meet the guarantee. On account of the high price of nitrogen-bearing materials for fertilizers there has been a strong temptation to the manufacturers to use materials that contain a high per cent of chemical nitrogen that is not readily available for plant food. Some of the larger and more reliable companies have submitted samples of these products to us for analysis with request that we advise them as to the propriety of their using them in mixed fertilizers. Where the availability has been low we have stated to the companies that we did not consider the use of these materials as legitimate, and this has generally been sufficient to prevent their use. Special determinations have to be made in the laboratory to determine available nitrogen. These tests have been run at frequent intervals, and there is no reason to suspicion that any considerable amount of fraudulent material has been used.

Paris green. Only five samples of Paris green were officially sent in during the past season. Some Paris green compounds have been sold for poisoning the boll weevil, but these are not subject to inspection under the law. There is probably no necessity at this time to take special notice of boll weevil poisons. However, if the *arsenate of lead* proves to be of sufficient value in the hands of the average farmer to bring about a large sale of this chemical for poisoning boll weevils on young cotton, it will be important to have proper police power over the sale of this product, as it will offer an excellent field for adulteration and fraud.

A mixture of *oats and barley* has been extensively put on sale for the past year. This was occasioned by the exceptionally high price of oats. Barley has been cheaper per pound than oats, and a mixture of the two grains would cheapen the product per hundred pounds, and fraud would not be detected by the average man. As whole grain is not inspected, the general vigilance of the inspection service was evidenced in this discovery. The Commissioner of Agriculture, after looking into the matter thoroughly, ruled that a mixture of this kind was a mixed feed, and should be properly labeled, and required that this mixture be labeled "mixed oats and barley feed," and we have accordingly made analysis of 414 of these samples.

More analyses have been made the past year than during any previous year of the work. Five thousand six hundred and thirty-eight analyses were made during the fiscal year for this work, covering 10,672 samples. This is more than twice the work done two years ago in this department, when the work was then considered most excellent for the number of men employed and the expense involved. The increased amount of work turned out has been due to a number of things, chief among them being the increased hours of laboratory work, increased convenience of laboratory equipment, long service of most of the men in a special line of analysis, and to the greatly increased efficiency of the inspection department of the service. No other state undertakes to make as many analyses, in proportion to the amount of fertilizer and feed stuffs sold.

The amount of feed stuffs manufactured from home raised material has greatly increased, though the total sales have decreased, which fact is to be noted with gratification, as it means that Louisiana is spending less money for feed stuff imported into the state.

STATION No. 3.

North Louisiana Station, Calhoun.

Mr. J. B. Garrett, assisted by Mr. T. I. Watson, again had charge of this station throughout the year. In the early spring all conditions were favorable to a fine crop from all experiments, but on the 26th of April a severe hail and wind storm destroyed completely all field and truck crops and did great damage to fruit trees, completely destroying a fine crop of peaches and grapes. It was the first of May before replanting could be done, and prospects for crops were very gloomy, especially for cotton, as a mild winter had permitted many boll weevils to hibernate. Rains were excessive during May and June, and at that time it looked like no cotton would be made, as all the forms were punctured by the weevil as fast as they appeared. However, hot, dry weather began about the first of July, and the boll weevils rapidly disappeared, and fairly good crops of cotton were made. A larger yield was secured than the average farmer secured before the boll weevil made its appearance. Very interesting data was secured from the experiments in check planting, in planting with several stalks in the hill, etc., but these results should be verified by repetition before they are published.

The oat crop was destroyed by hail, and did not recover. The corn and cotton crops on the rotation experiments again showed the great superiority of production under unfavorable conditions of soil where this system is adopted.

Soy beans also received special attention at this station. Better results were secured than were obtained at Baton Rouge. Under the most adverse conditions imaginable, fairly profitable returns were secured from one or two, out of more than eighty, varieties. It is possible that the hill section of Louisiana may produce a soy bean crop at a profit.

Peanuts were extensively planted for tests of fertilizer requirements, and for grazing experiments. The season for these was exceptionally adverse, and only about half average yields were secured, and very little return was shown from the application of fertilizers, as there was insufficient moisture to enable the plants to use the fertiflizer. At the same time, poor land produced about forty bushels of nuts and a ton of hay per acre. Crimson clover sown as a winter crop after peanuts has shown marked increase in vigor of growth. A striking example of the superior merit of the peanut in adverse seasons was shown in our grazing experiment where a comparison was made of the pork, produced from grazing hogs on peanuts, cowpeas and soy beans. On sandy land of fair quality peanuts sown in June, after oat stubble was plowed up, made a good growth throughout the dry weather, and gave a fairly good crop of hay and nuts. It is believed that peanut culture will become quite extensive in North Louisiana, and for that reason attention was given to the testing of varieties and to methods of curing.

Feeding experiments have been conducted on a smaller scale than the previous two years, but excellent results were again secured from feeding native cattle on corn silage, and cotton seed meal. Some peanuts, including tops and nuts, were fed to steers with good results, though at the present price it is better to sell the nuts than to feed them, but the fact is established that we can afford to grow these nuts to feed to beef cattle.

The herd of Red Polled cattle have done well, thirteen head of cattle, all practically grown, were unable to consume all the grass grown in twenty acres of average hill land set in Bermuda. They grazed on this from early spring until nearly Christmas without any other feed, and have been fat all the time. North Louisiana would be a splendid cattle raising country if the ticks were eliminated.

The flock of grade Southdown sheep have done well. We had lambs that weighed 60 to 65 pounds at three months old, 85 pounds at five and a half months old. Feeding the lambs ground tobacco leaves has been a satisfactory remedy for the stomach worms. If the farmers of the hill sections would universally avail themselves of this remedy, it would greatly multiply the number of sheep grown in the state. We can put early lambs on the Chicago market in April when they will bring from four to eight dollars to the head. If once the industry were established on a sufficient scale to justify buyers to come for them, every small farmer could very profitably keep a flock of sheep. I regard this demonstration of very great importance to the state.

The Hortoricultural work has been continued under Mr. E. J. Watson, and a number of lines of very interesting work is being followed. Great injury was done to the trees and vines by the April hail storm, and some of the trees will never recover. Some four hundred seedling peaches were put out the past year.

Mr. Watson has made some valuable demonstrations in the production of fall planted Irish potatoes, and also some excellent work along the line of selection for the fixation of desirable characters in potatoes. In a considerable number of truck crops a study has been made of the merits of individual plants and their transmission of desirable characters to their progeny. This work has especially been carried on for cantaloupes, watermelons, tomatoes and a number of other vegetables.

The North Louisiana Agricultural Society has continued to hold its meetings at the Station. These meetings are generally well attended and the farmers derive much good from them. Through the efforts of the Station, a number of the best agriculturists of the country have addressed the association during the year.

The Calhoun Agricultural Camp Meeting and Fair, which is held under the auspices of the North Louisiana Agricultural Society, was held this year in September and was said to be the best fair yet held. Although it was generally a very poor crop year, the farmers had engaged in greater diversification than ever before, and the exhibits were exceptionally numerous and of excellent quality. The livestock exhibits were good, especially the exhibit of hogs. The production of well bred hogs is coming to be a very important industry in North Louisiana, especially in the hill lands, and were it not for the fear of the hog cholera, the number of hogs raised in that portion of the state would multiply rapidly. There is considerable interest in the possibility of having the state provide for a hog cholera serum plant, and if the State Livestock Sanitary Board, or other organization, is provided with the proper means for undertaking this work, swine production will receive a wonderful impetus.

Mr. Garrett, Mr. T. I. Watson and Mr. E. J. Watson have delivered a number of addresses to farmers, attended meetings meeting of truck growers' associations, and have otherwise contributed to the discussion of agricultural problems of vital concern to the people of North Louisiana.

STATION No. 4.

Rice Experiment Station, Crowley.

This station was established at Crowley in the spring of 1909, by a Committee appointed from the State Board of Agriculture for the purpose. The Committee visited the different places seeking the location of the station, and after thorough consideration of the sites and their adaptability for the work contemplated, Crowley was selected. The community there donated sixty acres of land and gave $3,500 in money to aid the enterprise. The land was secured in time to plant a crop the past year. The National Department of Agriculture is working in hearty co-operation with us in this line, and have established a man permanently at Crowley to take charge of their part of the work, having made this provision to become operative in July, 1909. We secured as Assistant Director, Mr. F. C. Quereau, who took up his residence at Crowley and took charge of our part of the work the first of August. Mr. Quereau is a product of the rice section, a graduate of this institution, a post graduate of the University of Illinois, and was at the time of the election to this position, Professor of Animal Husbandry at the University of Tennessee.

The land secured is favorably located, and a good laboratory building has just been completed on the exterior, with the money given by the people of the rice section. The building is not furnished on the inside. It is hoped that the legislature will make a provision for completing the laboratory and equipping it for work.

A residence for the Assistant Director is also urgent.

The rice growers are enthusiastic in their support of the work here, and we hope it will become worthy of liberal financial support on the part of the state.

CHANGES IN STAFF OF STATIONS.

Dr. G. D. Harris and Mr. E. L. Whitney are no longer with the stations, owing to the discontinuance of the Geological Survey

Mr. F. C. Quereau was appointed Assistant Director of the Rice Experiment Station at Crowley.

Mr. J. G. Lee, Jr., resigned to enter another field, and no one was appointed to succeed him.

Mr. J. C. Summers resigned position as assistant chemist and Mr. P. S. Doherty was appointed a member of the staff to take the place of Mr. Summers.

Mr. A. Sheer, farm manager at Audubon Park, resigned and was succeeded by Mr. R. E. Graham.

PUBLICATIONS ISSUED DURING THE YEAR 1909.

Twenty-first Annual Report.

Bulletin No. 115—The Principles and Practice of Feeding, including our Available Stock Foods. (63 pages).

Bulletin No. 116—A Preliminary Report on the Anthracnose or Pod Spot Disease of Beans. (11 pages).

Bulletin No. 117—An Experimental Study of Bagasse and Bagasse Furnaces. (106 pages).

Bulletin No. 118—Corn, with special reference to selecting, grading, preserving seed, preparing exhibits, rules and regulations for judging, etc. (16 pages).

Report of Analyses of Commercial Fertilizers for Season 1908-9. (122 pages).

Report of Analyses of Commercial Feed Stuffs for Season 1908-9. (198 pages).

Circular:

Notes on planting and cultivation of corn.

The fertilizer and feed stuffs reports have become so voluminous that they encumbered the files of station publications, and, complying with the suggestion of the National Department of Agriculture, and with the approval of the Commissioner of Agriculture, and the custom that is being adopted in the other states, we have ceased to number these publications as a part of the serial set of station publications, and in the future they will be designated as reports for the year in which the analyses were made.

A large number of scientific and popular articles and papers have been published by the various members of the station staff. Considerable space would be consumed in enumerating them here.

GEOLOGICAL SURVEY.

As noted in our last report the geological survey work has been discontinued. However, the publication of the report on salt, a volume consisting of 260 pages, was issued during the past year; also report of 52 pages on the Caddo Oil Fields. The publication of these reports consumed all the funds on hand, and the Geological Survey Account has accordingly been closed.

Financial Statement.

(Receipts and Disbursements of all funds).

The following is a copy of the statement already rendered to the Federal authorities, showing the receipts and expenditures of the Hatch Fund and the Adams Fund for the year ending June 30, 1909:

Hatch and Adam Funds.

Dr.—	Hatch Fund.	Adams Fund.
To receipts from the Treasurer of the United States, as per appropriations for fiscal year ended June 30, 1909, under acts of Congress, approved March 2, 1887 (Hatch Fund) and of March 16, 1906, (Adams Fund).....	$15,000.00	$11,000.00
Cr.—		
By Salaries........................	$15,000.00	$ 8,105.51
Labor		1.00
Freight and express		37.41
Heat, light, water and power..............		104.66
Chemical supplies		226.88
Seeds, plants and sundry supplies..............		26.65
Feeding stuffs		16.85
Library		462.54
Scientific apparatus		1,238.94
Traveling expenses		256.30
Contingent expenses		4.10
Buildings and land.....................		519.16
Total	$15,000.00	11,000.00

We, the undersigned members of the State Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural and Mechancial College for the fiscal year ending June 30, 1909, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000.00 for the Hatch Fund, and $11,000.00 for the Adams Fund, and the corresponding disbursements are $15,000.00 for the Hatch Fund and $11,000.00 for the Adams Fund, for all of which the proper vouchers are on file, and have been examined by us and found correct.

(Signed) CHAS. SCHULER.

Commissioner of Agriculture and Immigration.

HENRY FUQUA,

Vice-President Board of Supervisors of the Louisiana State University and Agricultural and Mechanical College, and Ex-Officio Member of the State Board of Agriculture.

The following is a combined statement of the receipts and expenditures from December 1, 1908, to November 30, 1909, of funds other than those secured through Federal appropriations, statements covering same having been reported to the State Auditor after the accounts and vouchers for the above period had been examined and found correct by Mr. Henry Fuqua, Vice-President of the Board of Supervisors of the Louisiana State University:

STATE FUND.

Dr.

Cash on hand, Dec. 1, 1908	$ 458.98	
Received from State Treasurer	12,666.65	
Received from State University	900.00	
Received from Farm Products	2,685.43	
Received from Miscellaneous sources	338.74	
Cash deficit, Nov. 30, 1909	2,976.52	
Transferred from Fertilizer and Feed Stuffs Funds for experimental purposes	5,846.65	
Transferred from Geological Survey Fund, account Labor	320.87	—$26,194.18

Cr.

By Salaries	$ 3,235.35	
Labor	6,939.66	
Publications	1,431.02	
Postage and stationery	466.38	
Freight and express	385.89	
Heat, water and light	115.53	
Chemical supplies	55.42	
Seeds, plants and sundry supplies	1,211.19	
Fertilizers	383.45	
Feeding stuffs	1,146.48	
Library	573.17	
Tools, implements and machinery	1,153.86	
Furniture and fixtures	156.05	
Scientific apparatus	242.23	
Livestock	680.70	
Traveling expenses	1,221.84	
Contingent expenses	781.39	
Building and repairs	5,240.82	
Rent	647.50	
Exhibits	126.25	—$26,194.18

FERTILIZER, FEED STUFFS AND PARIS GREEN FUND.

Dr.

Cash on hand, Dec. 1, 1908	$ 1,251.02	
Received from State Treasurer (through Commissioner of Agriculture)	26,000.00	
Received from Miscellaneous sources	53.90	—$27,304.92

Cr.

By Salaries	$10,771.58
Labor	2,231.16
Publications	642.85
Postage and Stationery	502.64
Freight and express	150.46
Heat, water and light	463.37
Chemical supplies	1,026.59
Seeds, plants and sundry supplies	307.75
Fertilizers	95.35
Feeding stuffs	542.73

Library	35.82	
Tools, implements and machinery	730.67	
Furniture and fixtures	77.75	
Scientific apparatus	36.17	
Livestock	550.00	
Traveling expenses	487.95	
Contingent expenses	194.56	
Building and repairs	2,114.72	
Rent	80.00	
Transferred to Experiment Stations account State Fund	5,846.65	
Cash on hand, Nov. 30, 1909	416.15	—$27,304.92

GEOLOGICAL SURVEY FUND.

Dr.

Cash on hand Dec. 1, 1908	$ 728.55	
Received from the State Treasurer	2,000.00	—$ 2,728.55

Cr.

By salaries	$ 275.00	
Publications	1,868.70	
Field expenses	263.98	
Transferred to State Fund, acct. Labor	320.87	—$ 2,728.55

The books and vouchers for all these accounts have been examined by an expert, who has made his report to Mr. Henry L. Fuqua, to whom the books are submitted for approval.

Public Library

Twenty-third Annual Report

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

---

FOR 1910

TO THE GOVERNOR

BY W. R. DODSON, DIRECTOR

Ramires & Jones,
Baton Rouge, Louisiana.
1911

Louisiana State University and A. & M. College.

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR JARED Y. SANDERS, *President.*
HENRY L. FUQUA, *Vice-President of Board of Supervisors.*
CHAS. SCHULER, *Commissioner of Agriculture and Immigration.*
THOMAS D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS.

HENRY GERAC, Lafayette.
JOHN T. COLE, Monroe.
R. S. MOORE, St. Bernard.
JOHN J. HENDERSON, Lagan.
R. E. THOMPSON, Wilson.
JEFF D. MARKS, Crowley.
J. E. BULLARD, Belmont.

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
HAMILTON P. AGEE, B. S., Assistant Director, Audubon Park, New Orleans.
S. E. McCLENDON, B. S., Assistant Director, Calhoun.
FRIEND C. QUEREAU, M. S., Assistant Director, Crowley.
WM. L. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
W. G. TAGGART, B. S., Assistant Chemist, Audubon Park, New Orleans.
J. K. McHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
J. E. HALLIGAN, B. S., Chemist, Baton Rouge.
A. P. KERR, M. S., Assistant Chemist, Baton Rouge.
R. G. FULLER, B. S., Assistant Chemist, Baton Rouge.
R. BAUS, B. S., Assistant Chemist, Baton Rouge.
R. G. TILLERY, M. S., Assistant Chemist, Baton Rouge.
G. D. CAIN, B. S., Assistant Chemist, Baton Rouge.
P. H. DOHERTY, B. S., Assistant Chemist, Baton Rouge.
R. P. SWIRE, B. A., Treasurer, Baton Rouge.
J. B. GARRETT, B. S., Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
E. W. KERR, M. E., Professor Mechanical Engineering, Baton Rouge.
J. T. TANNER, B. A., Secretary and Stenographer, Baton Rouge.
IVY WATSON, Farm Manager, Calhoun.
E. J. WATSON, Horticulturist, Calhoun.
WALTER McCLENDON, Farm Manager, Baton Rouge.
V. L. ROY, B. S., in charge of Boys' Demonstration Work.

LOUISIANA STATE UNIVERSITY
AND AGRICULTURAL & MECHANICAL COLLEGE.

Office of Experiment Stations,
Baton Rouge, La., February 1, 1911.

To His Excellency, Jared Y. Sanders,
Governor of Louisiana:

Sir—In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 16, 1906, known as the Adams Act, providing for federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1910, and a financial statement for the government fiscal year, July 1, 1909, to July 1, 1910.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of federal funds, so as to show the total receipts and expenditures for twelve months.

Respectfully,
W. R. Dodson,
Dean and Director.

Station No. 1, Sugar Experiment Station,
Audubon Park, New Orleans.

Mr. H. P. Agee, Assistant Director, has had immediate charge of the work again during the past year and has discharged his duties faithfully.

FIELD EXPERIMENTS.

The field experiments have been very largely a continuation of those previously reported, most of them requiring a long series of results before conclusions can be drawn. The more important phases of the work are briefly discussed under appropriate headings.

Sugar cane seedlings.

We have continued the work of securing seedling canes of our own germination and also have imported seedlings that have been secured in tropical countries. The large number of seedlings secured by us in 1909 have been tried in the field and normal crops have been secured, in which polarization tests could be made of the sugar content. From the many hundreds few have been selected that present desirable characters for the field and also show up well in the laboratory. Several years of seedling propagation at the Station have clearly demonstrated that the characteristics of seedlings do not become firmly established until they have been propagated a number of years. Therefore, the work with many hundred canes entails a great deal of laboratory analyses, field notes, and extensive records. However, we have a number of canes that show an unusually high sucrose content for Louisiana and we feel very much encouraged from the outlook of this work.

Importation of foreign varieties.

During the past year we have imported new varieties of cane from foreign countries, taking all precautions to avoid the possibility of the introduction of foreign insects or fungus diseases of the sugar cane. So that we now have a very large collection of varieties of cane under observation.

Field work.

Field experiments have been continued mainly along lines previously outlined, covering questions of fertilization, methods of cultivation, rotation experiments, winter cover crops, etc., also covering spring versus fall planting of the different varieties and under different conditions.

Miscellaneous crops.

We have continued to give some attention to miscellaneous crops, including fiber plants, truck crops, fruits, forage crops and some medicinal plants.

Cane harvesters.

During the past year we have again devoted some of our plots to cane on which cane harvesters could be tried, and several inventors have spent a portion of the summer on the Station grounds perfecting machines for harvesting sugar cane. Much progress in this line has been made during the past year, and it really looks now as though we may in the near future satisfactorily harvest cane and strip the leaves from it at a material saving in cost.

Planters' meeting at the Station.

The June meeting of the Louisiana Sugar Planters' Association was held on the Station grounds and was the most largely attended meeting yet held. Numerous demonstrations were given in the use of implements for sugar plantations; addresses were delivered, and refreshments were served. These annual meetings at the Station have met with the very hearty endorsement of the sugar planters throughout the state.

Audubon Sugar School.

The fourth year men at the Audubon Sugar School of the Louisiana State University spent the grinding season in the sugar house of the Experiment Station. These students were under the supervision and instruction of the members of the University faculty during the entire season and excellent work has been done by them.

The sugar house.

The sugar house has been extensively repaired during the past year. New boilers and a new engine have been installed and other repairs made, at an expense of approximately $3,000. The buildings were also repaired and re-enforced but additional repairs are yet necessary to put everything in prime condition. The sugar house has been used several times during the year by inventors for experiments and demonstrations with machinery designed to improve sugar house operations. The experiments conducted in the sugar house during the grinding season have been largely directed toward methods of clarification, which matter will be referred to again under the heading chemical work of the Station.

Co-operative work.

The United States Department of Agriculture offered to carry on investigations on insects injurious to sugar cane, in co-operation with the Louisiana Station and we have made arrangements with the Bureau of Entomology by which we are to furnish office and laboratory space in one of the buildings at Audubon Park for their representatives to carry on these investigations, and most of the entomological investigations that we had under way that affect sugar interests have been turned over to the federal bureau. Mr. D. L. Van Dine had charge of this work during the greater portion of the year and was assisted by Mr. T. C. Barber. Toward the close of the year Mr. Van Dine was elected entomologist of the Experiment Station of Porto Rico, and Mr. T. C. Barber has been placed in charge of the work, and Mr. A. Cushman has been assigned as assistant to Mr. Barber. They have been carrying on experiments with the sugar cane beetle, the mealy bug and cane borer. It is hoped that the results there will be a material addition to our knoweldge of measures to control these pests.

CHEMICAL DEPARTMENT.

The chemical department has given primary attention to research work as provided under the Adams Act of the national government, along the lines outlined to and approved by the National Department of Agriculture. These investigations embrace a study of the constituents of sugar cane under various field conditions and a study of the composition of the sugar house products. During a portion of the year we had only one man on this work, Mr. W. G. Taggart, Dr. Yoder having resigned early in the year and Dr. W. E. Cross having assumed the position of Chief Chemist in September, 1910. This work has resulted in taking up certain questions of clarification where it seemed that improvement could be made in sugar house practice. It has been found that the application of the carbonatation process previously presenting seemingly unsurmountable difficulties, as applied to the cane juice, may be utilized with the proper control of temperature and some other factors. Laboratory experiments under careful control gave excellent results. Although these details were worked out late in the season, two small runs were made in the sugar house, where these laboratory results as tested gave very excellent results, and we believe that with another year for perfecting minor defects the method can be made thoroughly practicable in Louisiana sugar houses.

During the early part of the year some work was done on the use of formaldehyde in sugar house cane juices and also on the composition of certain organic acids in cane juices. The result of the study of formaldehyde has been published.

DEPARTMENT OF BACTERIOLOGY.

The bacteriological studies have been continued along lines indicated in last year's report, by Mr. W. L. Owen. The results of these investigations have been embodied into bulletin form and are now in press. It may be said here that Mr. Owen has demonstrated very conclusively that living microscopic organisms in raw sugars bring about a destruction of a certain amount of sucrose and the formation of a chemical substance that is optically active, thus producing errors in polarization. This substance has heretofore been unknown and it has consequently given rise to a certain amount of error in ordinary analytical work. This discovery will therefore be of exceedingly great value in contributing to greater scientific accuracy in the polarization of sugars. This work will be continued during the coming year with the expectation of getting additional data. It is also proposed to take up a study of bacterial flora of cane syrup, with the view of determining conditions that modify this flora and the influence these organisms may have on methods of treatment for the preservation of syrup; also other influence on the quality of syrup.

Station No. 2, State Station,
Louisiana State University, Baton Rouge.

The office of the Director is maintained on the campus of the Louisiana State University. All bulletins are issued from this Station and the laboratory for the analysis of fertilizers, feed stuffs and Paris green for the State Board of Agriculture and Immigration is also located here. The work of the several different departments is herein briefly summarized.

FARM DEPARTMENT.

On the first of February, 1910, Mr. S. E. McClendon, who had acted as Assistant Director for a number of years, was transferred to the North Louisiana Experiment Station at Calhoun, and the Director took up his residence on the Experiment Station Farm. The work of the Assistant Director has been assigned to other parties.

Field work.

The field work, covering experiments in the use of fertilizers, rotation crops, forage crops, fiber crops, miscellaneous and medicinal plants, has been continued along lines outlined in previous reports.

Corn.

In addition to conducting experiments previously outlined on corn we took up a study of the influence of suckering corn stalks and the ''ear to the row'' tests of seed and the selection and improvement of certain strains of seed corn. This work will also be continued for a number of years before any conclusions are announced.

Root crops.

The utilization of root crops was considerably enlarged and extended during the past year with very excellent results in feeding stock beets to dairy cattle and to hogs and in the utilization of rutabagas and sweet potatoes for fattening swine. Very large yields of stock beets and sweet potatoes have been secured, when following oats the past year when fed to hogs gave as large a return per acre in pounds of pork as could have been secured from feeding seventy-five bushels of corn. Bulletins have been published during the year giving the results in detail.

Fiber crops.

In 1909 we planted a much larger area of ramie than we had previously cultivated, because we had a number of applications for material on which to test machines for decorticating the fiber. Again these machines have failed to meet expectations and we have plowed up the greater portion of our ramie plots, though we shall not abandon the hope that some one will invent a machine that will successfully prepare the ramie plant for the market.

Forage crops.

The results of the past year have emphasized the desirability of greatly extending forage crop production in the state, and especially have the results of the past year verified the possibilities of the production of pork on forage crops at very small cost. The rather large list of forage crops that will grow in the winter time should give us a decided advantage in the production of hogs, cattle and sheep over the more northern latitudes where nothing is grown during the winter time.

DAIRY FARM.

A farm of eighty-seven acres southeast of Baton Rouge, belonging to the Agricultural College, which had been leased out for a number of years, has been transformed during the past year into a dairy farm, to be operated in conjunction with the dairy on the University grounds. The land had been very poorly cared for and was in very bad condition, but it is rapidly being transformed into a productive field and will be gradually developed into a demonstration dairy farm under the direction of the officers of the Experiment Station.

EXPERIMENT STATION DAIRY.

The Dairy has been under the immediate charge of Mr. C. H. Staples, a senior student of the College of Agriculture. The Dairy has been enlarged by the addition of several very valuable cows. A concrete silo was erected during the latter part of the summer at a cost of approximately $250. Additional machinery for grinding grain and hay was installed during the latter part of the year. The milk room has also been improved and additional equipment added. The increase of the herd has been cared for and we now have about as many young stock as we have cows in the dairy, and within a year and a half the number of animals producing milk will be approximately double that of the present number. Considerable improvement has also been made in the fences, gates and sheds in connection with the dairy buildings.

ENTOMOLOGICAL DEPARTMENT.

Upon the resignation of Mr. Wilmon Newell, formerly Entomologist of the Station and Secretary of the State Crop Pest Commission, Mr. J. B. Garrett, Assistant Director of the North Louisiana Experiment Station at Calhoun, was appointed to this position and took up his duties the first of January. The Legislature of 1910 established the State Livestock Sanitary Board and gave to this Board charge of the tick eradication work, formerly conducted by the Crop Pest Commission. The entomological investigations of the Crop Pest Commission were transferred to the Experiment Station, as was also all property belonging to the Commission. The work of the inspection of nurseries and the execution of police regulations for the prevention of the introduction of injurious insects and fungous diseases was given to the State Board of Agriculture. The work has thus been distributed so as to practically give the investigations to the Experiment Stations, the police power to the State Board of Agriculture and the tick eradication work to the Livestock Sanitary Board. This seems to be a much more effective plan of operation than that previously existing.

HORTICULTURAL DEPARTMENT.

Mr. George L. Tiebout has continued in charge of the work of this department and has faithfully and efficiently discharged every responsibility. During the summer arrangements were made by which Mr. Tiebout could give all his time to the Experiment Station work, and the work of teaching previously done by him was cared for by the addition of another member to the faculty of the University. A demonstration garden has been established for the primary purpose of producing vegetables for the University mess hall, and Mr. Tiebout will have charge of this work as well as the experimental work of the Station. A modern pumping plant has been installed and provision made for irrigating crops during the coming year. It is planned to produce all the vegetables that will be consumed by the students in the University mess hall and have some to ship to northern markets. The experimental work has continued along lines previously outlined. Greenhouse cucumbers were shipped to the northern markets during late winter and very early spring. The results of investigations in shipping to northern markets numerous vegetables, especially suited to the bluff soils of the state have given very satisfactory results. The citranges gave quite a large crop of fruit this year and we were able to test their merits on a much larger scale than previously. It seems that some of these fruits will have a commercial value. Experiments in the introduction of vegetable pears have been only partially successful, as the early frost greatly reduced the crop of these vegetables. We have not yet been able to overcome the diseases that prey upon the globe artichoke, although some progress has been made in this line during the past year.

DEPARTMENT OF VETERINARY SCIENCE AND ANIMAL PATHOLOGY.

Dr. W. H. Dalrymple has had a very large part of his time taken up in correspondence, in consultations and aiding in the establishing of the hog cholera serum plant and serving as a member of the Livestock Sanitary Board, particularly giving attention to the work of the eradication of the Texas fever cattle tick, and various other duties that have been performed by him. However, with his multitude of duties he found time to write Bulletin 115, on our available stock feeds, and Bulletin 122, giving the results of some of his experiments in feeding ground rice to mules, and Part I of Bulletin 124 on hogs. The pathological work conducted by Dr. Paulsen was interrupted by his resignation in October. Up to that time he had continued his investigations in the hyperimmunization of sheep against anthrax, and in securing data on the conditions that minimize the influence of the protective effect of anthrax vaccine. It is greatly to be regretted that Dr. Paulsen should give this work up to take up the practice of human medicine. Dr. Harry Morris, a graduate of the Veterinary Department of the University of Ohio, has been elected to succeed Dr. Paulsen, and we believe that he will ably carry the work forward. There has been no outbreak of cerebro spinal meningitis during the past year, so we have had no opportunity for extending our study on this subject.

DEPARTMENT OF PLANT PATHOLOGY.

Dr. C. W. Edgerton has been able to continue the prosecution of his investigations without interruption for another year. The work on bean anthracnose was completed and the results published in Bulletin No. 119. Some further work along this line will be conducted in 1911, but mainly for the purpose of giving demonstrations of the effectiveness of methods worked out and published in Bulletin 119. Work on the cotton boll rots has been continued and considerable valuable data added to that already on record. Fig diseases have been studied and some valuable and definite conclusions reached, which have been published in scientific journals. More attention has been given to sugar cane diseases than to any other one topic during the past year. It seems that these diseases have been rapidly spreading in the state and are of increasing importance. The results of some of this work have been published in Bulletin No. 120. The alfalfa diseases have continued to receive attention. The cause of the stem girdle has been definitely determined as due to an insect which girdles the stem and a fungus enters the tissue at this point. The fungus has been proven to be the same as the one that causes ''sore shin'' of cotton and the ''damping off'' of some other plants. Cotton seed poisoning of animals has received some attention in co-operation with the Department of Animal Pathology, and plans have been formed for enlarging the work the coming year, in the hope of securing some valuable data on this very important subject.

DEPARTMENT OF MECHANICAL ENGINEERING.

Professor E. W. Kerr has continued his investigations on bagasse fuel without interruption. A device for drying bagasse was constructed at Palo Alto plantation during the past summer at a cost of something more than a thousand dollars. In this work we have had the very cordial and financial support of the Lemann Company of Donaldsonville, who have furnished a boiler and sugar house equipment for these investigations. The results of the work are now being tabulated for publication in bulletin form. The result of these investigations will undoubtedly end in much greater economy in the utilization of bagasse as a source of fuel in the sugar houses of Louisiana.

CORN CLUBS AND AGRICULTURAL SCHOOLS.

During one-half the year the Experiment Stations paid one-third of the salary and traveling expenses of Professor V. L. Roy in his work of organizing corn clubs and assisting in the inauguration of agricultural work in the agricultural high schools of the state. We also furnished office room and facilities for Professor Roy for the entire year. The Legislature of 1910, however, made provision for the establishment of an Extension Department of the University, and Professor Roy was transferred to that department.

EXHIBIT AT THE STATE FAIR.

The Experiment Stations again made an exhibit at the State Fair at Shreveport. The exhibit consisted of enlarged photographs of crops, animals, buildings, equipment of the Experiment Stations, diagrams and specimens of plants, showing results of experiments, particularly in the production of corn, forage crops, feeding experiments, etc. Also graphic illustrations of the amount of fertility removed from the soil by different farm crops, the amount of fertilizer required to restore these ingredients; and many other phases of experiment station work were illustrated. These exhibits attracted much attention from farmers, and are no doubt of great value in stimulating interest in progressive agriculture.

LABORATORY FOR FEED STUFFS, FERTILIZERS AND PARIS GREEN.

The work of this department has continued in the immediate charge of Mr. J. E. Halligan, assisted by six chemists the greater part of the time. There has been improvement in the fertilizers and feed stuffs put on the markets of the state, indicated by the decreased number of samples that failed to be as good as the guarantee. There has been a considerable decrease in the amount of mixed feed stuffs consumed in the state, partly due to the large corn crop raised the previous year, and partly due to the fact that we have continuously urged the people to grow their feed at home. The effect of the boll weevil on the cotton crop has also aided in bringing about the home production of our supply of feed stuffs. Very few samples of Paris green have been analyzed, as there has been no considerable amount of Paris green used, either for fighting the cotton caterpillar or the boll weevil. Twenty-two hundred and ninety-six analyses of fertilizers were made during the fiscal year, covering 5999 samples; and 4422 analyses of feed stuffs, covering 9381 samples. During the latter part of the year we constructed a fire-proof hood adjoining the main laboratory, thus eliminating the very great danger of fire that has constantly menaced us heretofore. The capacity is such as to also increase the amount of work that may be accomplished in a given time in the laboratory. We have been very fortunate in maintaining a corps of chemists of high efficiency and exceptional devotion to their work. In every instance arising in which there has been a dispute over the result of analyses referees have verified the result secured in the laboratory.

Changes in staff: Mr. H. L. Green resigned to take up the study of medicine and was succeeded by Mr. G. D. Cain. Mr. R. E. Graham resigned as assistant chemist at Audubon Park to take up the study of medicine.

SPECIAL DEMONSTRATION TRAIN.

From the second to the fourteenth of October, 1910, some of the members of the Experiment Station staff and of the University faculty, in co-operation with the Southern Pacific Railway Company, operated a special train over the Southern Pacific lines, in an effort to stimulate greater interest in diversified farming and stock raising. The train carried two carloads of improved agricultural implements, a carload of cattle, representing two breeds of beef type, the dual purpose cow, and the dairy cow. Examples of the leading breeds of hogs were carried in another car provided especially for exhibition purposes. One passenger coach was transformed into a general exhibit car, in which were displayed samples of a great variety of farm crops, fruits, vegetables, fiber crops, etc., that were grown in the state, mostly at the Experiment Stations. In addition to operating the train, the Southern Pacific Company provided a dining car and standard sleeper for those assisting in the operation of the train and delivering lectures. The train traversed a little over a thousand miles of territory and meetings were held at forty-one places, with a total attendance of approximately 55,000 people. So far as we have the records, this is the most successful farmers' demonstration train yet operated in the United States, and the first to be operated in Louisiana in which exhibit material was adequately provided.

PARISH FAIRS.

At a considerable number of parish fairs members of the Experiment Station staff acted as special judges of livestock and agricultural exhibits. The demand for judges trained in special lines of agriculture is fortunately becoming more and more pronounced, which is of itself an indication of the growth and improvement in the character of parish fairs.

EXCURSIONS TO THE EXPERIMENT STATIONS.

In June, 1910, the Boys' Corn Clubs of Avoyelles Parish came in a special train to Baton Rouge to visit the Experiment Station and University. About 600 boys and men visited the Experiment Station and went over the plots upon that occasion. It is to be hoped that this kind of interest in Experiment Station work will be encouraged in every way possible.

Also, in June, 1910, the Frisco Railroad ran a special train from Baton Rouge to the Rice Experiment Station at Crowley, and a very large number of the members of the Legislature, including the Governor and Lieutenant Governor and other state officials, made the trip and went over the grounds of the new Rice Station. The visitors were most cordially received and dined by the citizens of Crowely, who, as it will be remembered, contributed very liberally to the founding of the Rice Station.

FARMERS' INSTITUTES.

The members of the Station staff have been called upon more extensively than ever before for special addresses at farmers' meetings, and for assisting in the organization of various clubs and societies for promoting special interests, and yet we have not been able to meet all the demands for this kind of work.

Station No. 3, North La. Experiment Station,

Calhoun.

On the first of February, 1910, Mr. J. B. Garrett, Assistant Director, was elected Secretary of the Crop Pest Commission, as previously referred to, and Mr. S. E. McClendon, Assistant Director at Baton Rouge, was transferred to Calhoun and has been in charge of the work there throughout the remainder of the year. All things considered we have had a favorable season at Calhoun, and the crops have been generally satisfactory, although the fall was very dry and fall crops have not been up to the standard. While the early freeze did considerable damage to farm crops, the replanting was followed by favorable seasons. Most of the experiments conducted there were a continuation of those previously outlined, and requiring observations over an extended period. They embraced rotation experiments, experiments in varieties and fertilizer requirements, particularly of cotton and corn. Experiments in the way of planting soy beans at different seasons throughout the year and testing their adaptability to that soil and climate have been continued, as have also tests of varieties of oats, clovers and other forage crops. The experiments in the influence of fertilizers on the quality of syrup made from sugar cane have been along the same general line as conducted for the past two or three years. The fertilizer experiments with Spanish peanuts have been enlarged and extended. The grazing experiments, in which hogs have been grazed on succession crops, particularly soy beans, peanuts, cowpeas and sweet potatoes, have given very excellent results, showing that pork can be produced on these crops at very low cost. Experiments in the addition of stable manure under varying conditions have also been continued.

Horticultural work.

Mr. E. J. Watson has continued in charge of the horticultural work of this Station, with very gratifying results secured the past season. We had a very large crop of peaches and a most excellent crop of grapes for the number of vines cultivated. In fact the crop of grapes of some of the varieties would have been a credit to any of the states where grape culture is well established. Mr. Watson is doing some excellent work along the line of breeding in cantaloupes, beans and watermelons. He is also comparing the different methods of cultivating orchards, experimenting in the use of winter cover crops for orchards, etc. Good progress is being made along all these lines.

Beef cattle.

The herd of ten high-grade Polled Angus heifers, placed on the Station as per previous report, have prospered, and the Station now has the first generation of offspring from these cattle. The experience of the past season has fully demonstrated the value of Bermuda as a grazing crop on the hill soils of North Louisiana.

Sheep.

The flock of grade Southdown sheep has done well during the past year and confirms results previously secured in the production of early lambs of good quality, and will no doubt lend encouragement to the development of the sheep industry in this state.

It is very much to be regretted that Mr. T. I. Watson, for many years Farm Manager of the North Louisiana Station, has tendered his resignation, effective February 1, 1911. Mr. Watson has served the Station long and well. He has been exceptionally faithful to every duty. He will be succeeded by Mr. J. E. Bryan.

North Louisiana Agricultural Society.

This organization has continued to hold its meetings at the Experiment Station. The meetings have been well attended and a great deal of good has been accomplished.

Agricultural Fair.

The annual fair held under the auspices of the North Louisiana Agricultural Society was again held at the Experiment Station and was the best fair that has yet been held. This fair is unique in that no admission fees are charged, the premiums being secured through subscriptions by the citizens of Ouachita Parish and the adjoining territory and firms who have commercial interests in that section of the State. The agricultural discussions held in connection with the fair are always productive of a great deal of good.

All of the members of the staff of this Station have participated in farmers' institutes and public meetings, in which agricultural topics were discussed.

Station No. 4, Rice Experiment Station,

Crowley.

The work of this Station has been in charge of Mr. F. C. Quereau, who has rendered excellent service in inaugurating the work there. The plots have been very carefully laid out and a series of elaborate experiments started. They embrace questions of fertilization, irrigation, crop rotation and allied subjects. The United States Department of Agriculture is working in co-operation with us and has enlarged its field of work in rice, giving special attention to a study of a very large number of varieties and to the fungus diseases and insect enemies of the rice crop. Very careful observations are being made and records kept of the temperature, rainfall, amount of evaporation and wind currents. This data will be very valuable for future reference.

A sixty horse-power double cylinder gasoline engine was installed in the early part of the year and has solved for us the irrigation problem at the Experiment Station. The deep well with this available power gives us the greatest abundance of water for irrigating the entire sixty acres of the Station, if it were necessary.

The foundation for a new barn for implements, grain and livestock has been laid and during the early part of the coming year the superstructure will be erected.

In June, 1910, the State Legislature provided for the financial support of the Rice Experiment Station, appropriating $7500 each year for two years.

PUBLICATIONS ISSUED DURING 1910.

Twenty-second Annual Report.
Bulletin 119, Bean Anthracnose.
Bulletin 120, Some Sugar Cane Diseases.
Bulletin 121, The Sugar-Cane Mealy-Bug.
Bulletin 122, Rough Rice as Feed for Horses and Mules.
Bulletin 123, Some Grazing and Soiling Experiments.
Bulletin 124, Part I: Breeds of Hogs;
Part II: The Best Crops to Grow for Hogs, and Other Data.
Report of Analyses of Commercial Fertilizers for Season 1909-1910.
Report of Analyses of Commercial Feed Stuffs for Season 1909-1910.

The following is a list of scientific articles published by members of the Station staff during the year in scientific journals and magazines. Most of these articles are of a technical nature and this means of publication was considered advisable. In addition to these articles numerous popular articles based on experiments and observations at the Experiment Stations and elsewhere have been prepared for agricultural papers, special editions of weekly and daily papers. These articles have been too numerous to list in this publication.

Colletotrichum falcatum in the United States.
By C. W. Edgerton (Science, n. s. XXXI, pp. 717, 718).

The Diseases of Sugar Cane.
By C. W. Edgerton (Louisiana Planter, No. 44, pp. 484, 485; also, The Modern Sugar Planter, Vol. I, No. 4, pp. 9, 10).

Trochila populorum.
By C. W. Edgerton (Mycologia, No. 2, pp. 169-173).

The Antiseptic Value of Sulphites as a Preservative of Cane Syrup.

By W. L. Owen. Submitted to the Referee Board of Consulting Scientific Experts of the U. S. Department of Agriculture. (To be published.)

Occurrence of Formaldehyde in Sugar House Products.

By P. A. Yoder and W. G. Taggart (International Sugar Journal, Vol. XII, No. 137, 1910).

Experiments on Clarification.

By Dr. W. E. Cross (The Modern Sugar Planter, Vol XLI, No. 15, 1911).

Loss of Invert Sugar in the Carbonatation Process.

By Dr. W. E. Cross (The Louisiana Planter, Vol. XLVI, No. 4, p. 55).

Progress in the Propagation of Seedlings of Sugar Cane in Louisiana.

By H. P. Agee (American Breeders Magazine, Vol. I,. No. 4).

Molasses and Sugar Methods.

(Referee Report on Co-operative Work of the Association of Official Agricultural Chemists.) By Hamilton P. Agee. Proceedings of the A. O. A. C., 1910. Bureau of Chemistry, U. S. Department of Agriculture.

German and Russian Official Methods for Raw Sugar Analysis.

By Dr. W. E. Cross (The Louisiana Planter, Vol. XLVI, No. 6; The Modern Sugar Planter, Vol. XLI, No. 19).

American Molasses Feeds; Their Manufacture and Composition.

By J. E. Halligan (Journal of Industrial and Engineering Chemistry).

A Direct Method for the Determination of Available Phosphoric Acid, American Fertilizer.

By J. E. Halligan and W. G. Taggart.

Theory and Therapy of Milk Fever, So-Called.

By W. H. Dalrymple (American Veterinary Review, Vol. XXXVII, No. 3).

An Experimental Study of the Performance of Fifteen Boiler Furnaces with Bagasse as Fuel; The Insulating Properties of Steam-Pipe Covering; and Power Required to Run Sugar House Machinery.

By Professor E. W. Kerr (Modern Sugar Planter of New Orleans).

FINANCIAL STATEMENT.

(Receipts and disbursements of all funds.)

The following is a copy of the statement already rendered to the federal authorities, showing the receipts and expenditures of the Hatch Fund and the Adams Fund for the year ending June 30, 1910:

HATCH AND ADAMS FUNDS.

Dr.	Hatch Fund.	Adams Fund.
To receipts from the Treasurer of the United States, as per appropriations for fiscal year ended June 30, 1910, under acts of Congress, approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$13,000.00
Cr.		
By—		
Salaries	$13,689.85	$9,677.34
Labor	336.80	334.29
Publications	304.70	......
Postage and stationery	4.50	3.00
Freight and Express	3.18	12.25
Heat, light, water and power	....	403.73
Chemical supplies	....	560.52
Seeds, plants, and sundry supplies	66.47	46.51
Feeding stuffs	169.96	29.65
Library	......	5.33
Tools, implements and machinery	69.67	38.78
Furniture and fixtures	.....	57.00
Scientific apparatus	.....	1,346.24
Live stock	27.50	8.95
Traveling expenses	.....	421.30
Contingent expenses	302.15	29.21
Buildings and land	25.22	25.90
Total	$15,000.00	$13,000.00

We, the undersigned members of the State Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the fiscal year ending June 30, 1910, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000 for the Hatch Fund, and $13,000 for the Adams Fund, and the corresponding disbursements are $15,000 for the Hatch Fund and $13,000 for the Adams Fund, for all of which the proper vouchers are on file, and have been examined by us and found to be correct.

(Signed) Chas. Schuler,
Commissioner of Agriculture and Immigration.
(Signed) Henry L. Fuqua,
Vice-President of the Board of Supervisors of the Louisiana State University and Agricultural and Mechanical College, and Ex-Officio Member of the State Board of Agriculture.

The following is a combined statement of the receipts and expenditures from December 1, 1909, to November 30, 1910, of funds other than those secured through federal appropriations, statements covering same having been reported to the State Auditor after the accounts and vouchers for the above period had been examined and found correct by Mr. Henry L. Fuqua, Vice-President of the Board of Supervisors of the Louisiana State University:

STATE FUND.

Dr.

Received from State Treasurer	$16,041.65	
Received from Commissioner of Agriculture	496.99	
Received from University Treasurer	300.00	
Received from sale of farm products, etc.	5,243.18	
Transferred from fertilizer account	3,000.00	
Credit, cash, Station No. 3, 6-11-10	857.32	—$25,939.14

Cr.

Salaries	$ 3,070.41	
Labor	7,088.49	
Publications	296.97	
Postage and stationery	569.59	
Freight and express	369.62	
Heat, water, light, and power	519.61	
Chemical supplies	54.20	
Seeds, plants and sundry supplies	1,623.10	
Fertilizers	360.04	
Feeding stuffs	1,583.51	
Library	137.91	
Tools, implements and machinery	1,180.20	
Furniture and fixtures	78.05	
Scientific apparatus	24.30	
Livestock	1,467.39	
Traveling expenses	1,316.12	
Contingent expenses	3,168.14	
Building and repairs	2,551.38	
Miscellaneous	277.63	
Actual deficit	202.48	—$25,939.14

FERTILIZER, FEED STUFF AND PARIS GREEN FUND.

Dr.		
Cash on hand, December 1, 1909	$ 416.15	
Received from J. G. Medlenka, account Rice Station, 3-17-10	3,500.00	
Received from Commissioner of Agriculture	21,400.00	
Received from miscellaneous sources	358.81	
Deficit	2,189.89	—$27,864.85
Cr.		
Salaries	$ 9,413.39	
Labor	1,440.65	
Publications	1,302.30	
Postage and stationery	374.17	
Freight and express	358.13	
Heat, water, light and power	484.11	
Chemical supplies	1,252.81	
Seeds, plants, and sundry supplies	162.08	
Fertilizers	58.52	
Feeding stuffs	296.70	
Library	41.05	
Furniture and fixtures	1.50	
Tools, implements and machinery	2,625.00	
Live stock	1,200.00	
Traveling expenses	251.14	
Contingent expenses	700.67	
Building and repairs	4,862.63	
Scientific apparatus	40.00	
Transferred to the State Fund account	3,000.00	—$27,864.85

The books and vouchers for all these accounts have been examined by an expert, who has made his report to Mr. Henry L. Fuqua, to whom the books are submitted for approval.

Very respectfully,
W. R. Dodson,
Dean and Director.

Available Bulletins.

The following is a list of the available bulletins of the Experiment Stations, and requests for these publications should be addressed to the Baton Rouge Station:

Bulletin No. 5—Sugar Making on a Small Scale.
Bulletin No. 67—Broom Corn, How to Grow and Cure It.
Bulletin No. 68—Home Grown vs. Purchased Seed.
Bulletin No. 70—Cane Borer (*Diatroea Saccharalis*).
Bulletin No. 71—Report of North Louisiana Experiment Station, 1901.
Bulletin No. 73—Analyses of Commercial Fertilizers and Paris Green.
Bulletin No. 75—Preservation of Cane Syrups, and Yeasts, Moulds, Bacteria and Enzymes.
Bulletin No. 76—Analyses of Commercial Fertilizers and Paris Green.
Bulletin No. 79—Results of Experiments with Nodule Diseases of the Intestines of Sheep.
Bulletin No. 80—Analyses of Commercial Fertilizers and Paris Green.
Bulletin No. 82—The Texas Fever Cattle Tick Situation, and the Eradication of the Tick by a Pasture Rotation System.
Bulletin No. 83—Results of Further Experiments with Nodule Diseases of Sheep; Bare-Lot Method of Raising Lambs.
Bulletin No. 84—Texas Fever.
Bulletin No. 85—Black Leg.
Bulletin No. 87—Analyses of Commercial Fertilizers and Paris Green.
Bulletin No. 88—Commercial Feeding Stuffs.
Bulletin No. 89—Nodule Diseases of Intestines of Sheep; Bare-Lot Method of Raising Lambs.
Bulletin No. 91—Chemistry of Sugar Cane and Its Products in Louisiana.
Bulletin No. 93—Second Report on the Horseflies of Louisiana.
Bulletin No. 94—Effects on the Human System of Louisiana Manufactured Syrups and Molasses.
Bulletin No. 95—Diseases of Lambs and Sheep; Bare-Lot vs. Grass Lot.

Bulletin No. 96—Cotton Wilt.
Bulletin No. 97—Analyses of Commercial Fertilizers and Paris Green.
Bulletin No. 98—Commercial Feeding Stuffs.
Bulletin No. 99—Japanese Persimmons.
Bulletin No. 100—The Root Diseases of Sugar Cane.
Bulletin No. 101—The Diseases of Pepper and Beans.
Bulletin No. 102—Dairy Herds and Their Milk Production, Hammond, La.
Bulletin No. 103—Sulphur and Its Combinations in the Sugar House.
Bulletin No. 104—Feeding Blackstrap Molasses to Young Calves.
Bulletin No. 105—Diseases Affecting Rice in Louisiana.
Bulletin No. 106—Cerebro-Spinal Meningitis of Horses.
Bulletin No. 107—Preliminary Tests of Sugar House Machinery.
Bulletin No. 108—A Preliminary Report on Some Diseases of Chickens.
Bulletin No. 109—Experiments with Bacterium Anthracis, Anthrax Vaccines and Hyperimmunization.
Bulletin No. 110—Comparison of Cotton Seed Meal and Hulls with Cold Pressed Cake as a Dairy Feed.
Bulletin No. 111—Rotation Experiments in Cotton, Corn, Oats and Cow Peas.
Bulletin No. 112—Orchard Report of Baton Rouge Station.
Bulletin No. 113—Analyses of Commercial Fertilizers and Paris Green.
Bulletin No. 114—Analyses of Commercial Feeding Stuffs.
Circular on Anthrax or Charbon (by Dr. W. H. Dalrymple, M. R. C. V. S.).
Bulletin No. 115—The Principles and Practice of Feeding, Including Our Available Stock Foods.
Bulletin No. 116—A Preliminary Report on the Anthracnose or Pod Spot Disease of Beans.
Bulletin No. 117—An Experimental Study of Bagasse and Bagasse Furnaces.
Bulletin No. 118—Corn, with special reference to selecting, grading, preserving seed, preparing exhibits, rules and regulations for judging, etc.

Report of Analyses of Commercial Fertilizers for Season 1908-9.

Report of Analyses of Commercial Feed Stuffs for Season 1908-9.

Bulletin No. 119—Bean Anthracnose.

Bulletin No. 120—Some Sugar Cane Diseases.

Bulletin No. 121—The Sugar-Cane Mealy-Bug.

Bulletin No. 122—Rough Rice as Feed for Horses and Mules.

Bulletin No. 123—Some Grazing and Soiling Experiments.

Bulletin No. 124—Part I: Breeds of Hogs;
Part II: The Best Crop to Grow for Hogs, and Other Data.

Report of Analyses of Commercial Fertilizers for Season 1909-10.

Report of Analyses of Commercial Feeding Stuffs for Season 1909-10.

TWENTY-FOURTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

FOR 1911

TO THE GOVERNOR

By W. R. DODSON, Director

Louisiana State University and A. & M. College.

Louisiana State Board of Agriculture and Immigration.

EX-OFFICIO.

GOVERNOR JARED Y. SANDERS, President.
HENRY L. FUQUA, Vice-President of Board of Supervisors, Louisiana State University.
E. O. BRUNER, Commsssioner of Agriculture and Immigration.
THOMAS D. BOYD, President Louisiana State University.
W. R. DODSON, Director of Experiment Stations.

MEMBERS.

R. S. MOORE, St. Bernard.
HENRY GERAC, Lafayette.
JOHN T. COLE, Monroe.
JOHN J. HENDERSON, Lagan.
R. E. THOMPSON, Wilson.
JEFF D. MARKS, Crowley.
J. E. BULLARD, Belmont.

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
S. G. CHIQUELIN, B. S., Assistant Director, Audubon Park, New Orleans.
S. E. McCLENDON, B. S., Assistant Director, Calhoun.
FRIEND C. QUEREAU, M. S., Assistant Director, Rice Exp. Station, Crowley
W. E. CROSS, Ph. D., Chemist, Audubon Park, New Orleans.
W. G. TAGGART, B. S., Assistant Chemist, Audubon Park, New Orleans.
WM. G. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
J. K. McHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
J. E. HALLIGAN, B. S., Chemist, Baton Rouge.
A. P. KERR, M. S., Assistant Chemist, Baton Rouge.
R. BAUS, B. S., Assistant Chemist, Baton Rouge.
R. G. FULLER, B. S., Assistant Chemist, Baton Rouge.
G. D. CAIN, B. S., Assistant Chemist, Baton Rouge.
J. M. JENNINGS, B. S., Assistant Chemist, Baton Rouge.
S. BYALL, B. S., Assistant Chemist, Baton Rouge,
ROGER P. SWIRE, M. A., Treasurer, Baton Rouge.
J. B. GARRETT, B. S., Entomologist, Baton Rouge.
E. S. TUCKER, Associate Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
W. H. DALRYMPLE, M. R C. V. S., Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
E. W. KERR, M. E., Professor Mechanical Engineering, Baton Rouge.
HARRY MORRIS, D. V. M., Assistant Veterinarian and Bacteriologist.
FRANK CRAIG, Secretary and Stenographer, Baton Rouge.
WALTER McCLENDON, Farm Manager, Baton Rouge.
EWELL CAMP, Mailing Secretary, Baton Rouge.
J. E. BRYAN, Farm Manager, Calhoun.
E. J. WATSON, Horticulturist, Calhoun.
HENRY STAPLES, B. S., in charge of Dairy, Baton Rouge.

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE.

Office of Experiment Stations,
Baton Rouge, La., January 15, 1912.

To His Excellency, Jared Y. Sanders,
Governor of Louisiana.

Sir:—In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 16, 1906, known as the Adams Act, providing for Federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1911, and a financial statement for the government fiscal year, July 1, 1910, to July 1, 1911.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of Federal funds, so as to show the total receipts and expenditures for twelve months.

I have asked each of the Assistant Directors to prepare a report of the work directly under his charge. I have also had the research members of the staff submit reports. I have used these in the preparation of the report, some times making material condensation of statement and some times quoting verbatim without designating the portion that is the exact language of the party writing the report to the Director.

Very respectfully,

W. R. Dodson,
Director.

Station No. 1, Sugar Experiment Station

AUDUBON PARK, NEW ORLEANS.

Mr. Hamilton P. Agee continued in charge of this station up to June 1, 1911, when he resigned to accept an important position with the Experiment Station of the Hawaiian Sugar Planters' Association, at Honolulu. Mr. W. G. Taggart, who has served several years as assistant chemist of the station, was placed in charge of the work on the retirement of Mr. Agee until an assistant director could be selected. Mr. S. G. Chiquelin, a former graduate of the Audubon Sugar School, who was for a number of years chemist and sugar maker of the station and, for a period, assistant director, was engaged as assistant director for this station. However, owing to previous engagement for the grinding season, he has not been able to give all his time to the station work and Mr. Taggart has, therefore, practically had charge of the work of the station.

The field experiments have been very largely a continuation of those previously reported, most of them requiring a long series of results before conclusions can be drawn. The more important phases of the work are briefly discussed under appropriate headings. .

SUGAR CANE SEEDLINGS.

Special attention has been devoted to further work on the propagation of seedling canes, and the results have been gratifying. The station has been aided in this work by contributions of seed from the following scientists, viz., C. F. Eckart, Director, Hawaiian Sugar Planters' Experiment Station, Honolulu, T. H.; W. D. May, Special Agent in Charge, Experiment Station, Mayaguez, Porto Rico; F. Evans, Superintendent, Botanical Department, Port-of-Spain, Trinidad; J. B. Harrison, Director, Science and Agriculture Department, Georgetown, Demerara; J. R. Bovell, Superintendent of Agriculture, Bridgetown, Barbados, and J. C. Hitchman, Cuatotolapam, Ver. Mexico. The seed thus secured were planted in the propagating house at Audubon Park, and thirty-eight varieties resulted. It is hoped that some good canes may be developed from this planting.

During the grinding season the station has been called upon to ship cuttings of its best and most promising varieties of cane to points in Louisiana and contiguous states, and also to Australia, Philippine Islands, Ecuador, Argentina, Mexico and Brazil, receiving in return some cuttings of their canes, one of which (D. 1135) has attracted much attention on account of its tremendous tonnage in Java.

The work of the *Chemical Department,* under Dr. Wm. E. Cross, has shown much progress during the past year. The investigations have been continued along two main lines, viz., clarification and methods of sugar house analysis, and reports of the results of work done have been published in the leading scientific journals.

A very thorough study of clarification methods has been made, both in the laboratories and in the sugar house, with important results. The application to cane juices of the carbonation process, which is used exclusively in beet work, has been carefully studied, and modifications evolved by which the difficulties in its adoption may be overcome. Following from this work, a rational method of alkaline clarification has been evolved with interesting results. Work has also been done on the clarification of syrups, for the manufacture of white sugar. The syrup obtained usually contains a good deal of matter in suspension which gives the sugar a grayish color. Considerable success has been met with in our attempts to remove this suspended matter and produce a transparent, clear syrup. A bulletin on this work is in preparation and interim reports thereof have already appeared in the scientific press (see below).

The investigations along the line of methods of analysis included methods for the analysis of juices, syrups and molasses, and sugar house products in general, for sucrose, glucose and other constituents. Several portions of this work have already been published (see below), but it is intended at an early date to present a full and complete report for publication as a bulletin, which it is hoped will be of very considerable value to the sugar industry of this state.

The Chemical Department is also responsible for the chemical side of the work on the bacterial deterioration of sugars (Bulletin 125); this work, entailing a close study of the gums and other products of sugar deterioration, was carried out mainly by Mr. W. G. Taggart, Assistant Chemist.

An investigation of considerable theoretical interest was a study of the *chemical constituents of cane seed,* which was inaugurated and carried through in the early part of the year.

During the year, 86 miscellaneous analyses of various products were made by the station.

The Referee work on sugars for the Association of Official Agricultural Chemists of the United States was again assigned by that body to this station for 1910-1911, and again for 1911-1912, Dr. Wm. E. Cross being Referee in each year. This work on analytical methods is planned in each year by the Referee, and carried out by him in conjunction with co-operators in different parts of the country. It is of the highest importance in investigating and standardizing methods for reliable analytical work.

The June meeting of the *Louisiana Sugar Planters' Association* was held as usual on the station grounds, with a larger attendance than at any previous gathering. The exhibits of agricultural implements and sugar house machinery, and the various products used in the sugar industry, were numerous and interesting and evidenced a desire on the part of manufacturers to avail themselves of the advertising features of the annual meetings. At this meeting the Eastman Cable Tractor, and the Zelle ''Modern Cane Loader'' were publicly demonstrated.

For the first time, in many years, no *cane harvesting machines* were placed at the station for test. The ''Luce'' and ''Piatt'' machines, previously exhibited at the station, were tested on plantations in the interior of the state, but no definite details of their operations have reached the station.

The regular practical course of the *Audubon Sugar School* was given in the sugar house and laboratories of the institution, the class of advanced students in attendance being the largest on record, and at the termination of the course, all the members of the class were released to accept positions in Louisiana and in the tropics.

The *Federal Bureau of Entomology,* working in co-operation with the station, has done some effective work under the guidance of Mr. Thomas C. Barber, the entomologist in charge of the experiments, the results of which have been published in a circular on the ''Damage to Sugar Cane in Louisiana by the Sugar Cane Borer.''

RENEWAL OF LEASE.

Our lease of the ground from the Audubon Park Commission was to have expired March, 1912. However, the Commission has shown its interest in the work there by offering to renew the lease with the understanding that they are to give us a warning of three years when it becomes necessary for them to have the ground for park purposes, and consequently the work will continue there for some time undisturbed. It is our plan to make some improvements during the year which we could not have made had we been forced to move in the near future.

DEPARTMENT OF BACTERIOLOGY.

Bacteriological studies have been continued along lines indicated in last year's report, with few new phases of the work enlarged. Arrangements were made by which Mr. W. L. Owen, in charge of this work, could pursue his studies in Germany for a period of one year, and, in August, he was released to make preparation for his studies in Germany. However, a large sugar refining company was having a great deal of trouble from deterioration of sugars in one of their factories, and, yielding to their earnest solicitations, Mr. Owen was authorized to spend a month in one of their factories to help them locate their trouble and help eliminate it. The results of this work was a great benefit to the investigations in hand and also to the refining company. At the present time, Mr. Owen is pursuing his work on this same line under the assistance and suggestions of authorities of the University of Göttingen.

Station No. 2, State Station

Louisiana State University, Baton Rouge.

The office of the Director is maintained on the campus of the Louisiana State University. All bulletins are issued from this Station and the laboratory for the analysis of fertilizers, feed stuffs and Paris green for the State Board of Agriculture and Immigration is also located here. The work of the several different departments is herein briefly summarized.

FIELD WORK.

The field work, covering experiments in the use of fertilizers, rotation of crops, forage crops, fiber crops, miscellaneous and medicinal plants, has been continued along lines outlined in previous reports.

CORN.

Various experiments previously outlined on corn have been continued. The results of the study of the influence of suckering corn has again indicated that pulling the suckers from the stalk has very little influence on the yield of corn. The ear to the row test of seed has been continued with indications that there are sometimes a difference of eight to ten bushels in yield per acre in different ears of the same variety of corn. In the experiments on the methods of cultivation results have again been in favor of rather narrow rows and shallow cultivation. Tests of the application of fertilizers has shown some general tendencies of variations that has characterized previous experiments in this line.

ROOT CROPS.

While the root crops of the fall of 1910 gave us the largest yield that we have ever secured, the fall of 1911 has been very unfavorable to these crops, and has given us about the poorest results ever secured. However, in spite of adverse conditions, sweet potatoes, stock beets and rutabagas have again demonstrated their right to a place on the average farm of South Louisiana as an important source of stock feed. Another bulletin was issued during the year giving results of our experiments on feeding root crops to hogs.

FIBER CROPS.

While we have sent several samples of both green and dry ramie to inventors of machines that were intended to decorticate the fiber, no machine has yet met with expectations. It is hoped, however, that perseverance in this line will be awarded with a successful machine and the barks of such plants as ramie may become a great source of fiber in the United States.

FORAGE CROPS.

The results of the past season in the production of forage crops has not been quite as gratifying as previous years owing to the adverse season, but, as compared with other crops, we have had good results. We continued to secure most excellent returns from grazing hogs on cowpeas and corn. Peanuts have also given very excellent returns in pork from grazing. Soybeans have again been a disappointment to us, confirming previous indications that this plant will not be of as great value on the bluff soils as on the poorer type of land. Some of the plants that have been greatly advertised by promoters have been again tried and shown to be of little value.

SILO.

The silo at the dairy farm has been an unqualified success again. We added six feet to the heighth of the silo which has materially increased its capacity. Most excellent returns have been secured by feeding silage from corn, mixed corn and soybeans, sorghum, and soybeans alone. The value has ranked about in the order they are given.

We have tabulated results of the feeding experiments which will be issued in bulletin form as soon as funds are available to pay for the publication.

DAIRY FARM.

A farm of eighty-seven acres, southeast of Baton Rouge, belonging to the Agricultural College, which had been leased out for a number of years, was transformed during 1910 into a dairy farm, to be operated in conjunction with the dairy on the University grounds. The land had been very poorly cared for and was in very bad condition, but it is rapidly being transformed into a productive field and will be gradually developed into a demonstration dairy farm under the direction of the officers of the Experiment Station. A hay barn and implement shed were erected during the last summer, costing about $400.

EXPERIMENT STATION DAIRY.

The dairy has been under the immediate charge of Mr. C. H. Staples, a graduate of the College of Agriculture in 1911. The dairy has been enlarged by the addition of several very valuable cows. The increase of the herd has been cared for and we now have about as many young stock as we have cows in the dairy, and within a year and a half the number of animals producing milk will be approximately double that of the present number. Considerable improvement has been made in the fences, gates and sheds in connection with the dairy building.

ENTOMOLOGICAL DEPARTMENT.

The entomological department has continued under the supervision of Mr. J. B. Garrett, assisted by Mr. R. W. Moreland. Important work has been done in studying the damages to stored rice by grain insects, general study being made of a number of insects causing serious damage, their life history and their resistance to fumigation, etc. The work of inspecting nurseries and the shipment of nursery stock was transferred to the State Board of Agriculture by the Legislature of 1910, but no provision was made for meeting the expense of this work, and it was too important to be allowed to go by default, and so the Experiment Stations have met the expense.

HORTICULTURAL DEPARTMENT.

Mr. Geo. L. Tiebout has continued in charge of the work of this department and has faithfully discharged the responsibilities resting on him. He has given quite a considerable portion of his time to the vegetable garden for the production of vegetables for the University Mess Hall, continuing with this work a certain amount of experimental work that will be of value to the Station.

A pumping plant has been installed for the experimental plots, so that we now have one plant operated by gasoline and one by electric power, the city electric company extending a wire to the lake front for the purpose of operating this pump.

Considerable attention has been given to the production of cauliflower with very gratifying results. Shipments have been made to all the northern and eastern cities. Shipments to Boston, Mass., netted us as much as 27½ cents per head after paying transportation and commission charges. Most of the other experiments have been in the way of continuing the lines already reported. This department has also grown beans and other plants for the experiments of the Department of Plant Pathology.

DEPARTMENT OF VETERINARY SCIENCE AND ANIMAL PATHOLOGY.

Dr. W. H. Dalrymple has had a very large part of his time taken up in correspondence, in consultations and serving as a member of the Live Stock Sanitary Board, particularly giving attention to the work of eradication of the Texas fever cattle tick. Various other duties have been performed by him. He has been especially successful in organizing branches of the Tick Eradication League and in securing the construction of dipping vats in parishes where the Live Stock Sanitary Board has not actively taken up the work of tick eradication. Dr. Dalrymple and Mr. A. P. Kerr have together worked out a method of precipitating the arsenic of the arsenical dip, rendering it harmless, and, therefore, obviating the danger of poisoning in cleaning the dipping vat. The results of this work are fully described in Bulletin No. 132.

Dr. Harry Morris has pursued his investigations in anthrax and cotton-seed meal poisoning throughout the entire year. Work on cotton-seed meal poisoning is briefly referred to under the Department of Plant Pathology. That on anthrax has been devoted largely to determining to what extent the digestive fluids of carrion-eating animals would have on the virulence of anthrax organisms with a view of determining the importance of these animals as disseminators of the disease. Special attention has been given to the study of feces of buzzards, dogs, cats and hogs that have consumed the carrion of animals affected with virulent anthrax. Results of very great importance to the state have been secured and will be published in bulletin form in the very near future.

Cerebro Spinal Meningitis.—There has been no outbreak of the disease brought to the notice of the Station during the year, so the work has been confined to testing the effects of the common molds upon experimental animals.

DEPARTMENT OF PLANT PATHOLOGY.

During 1911 the work in the Department of Plant Pathology has followed in a general way the work of the preceding years. The work has included the following:

Bean Diseases.—Two bean diseases have been studied. The work on the bean anthracnose has included some seed treatment experimnts and observations on the prevalence of the disease where the recommendations given in Bulletin 119 were carried out. All the data that has accumulated since this bulletin was published has further convinced us that this disease can be controlled by following out the recommendations given. A study of the blight was started during the year. This study has included observations on the spread of the disease, infection experiments, and the practicability of its control by seed treatment. From one year's experiments on two crops, we believe that this trouble can be controlled to a great extent by proper seed treatment.

Fig Diseases.—The work on fig diseases was completed during the year and the results published in Phytopathology and as Bulletin 126 of the Experiment Station.

Cotton Boll Rots.—A large amount of time was spent on the cotton boll rot troubles during the year and considerable data was procured on the severity of the troubles, the life history of the different boll rot organisms, and their methods of infection and dissemination. It is expected that the work of the past four years on these troubles will be published in bulletin form some time during 1912.

Sugar Cane Diseases.—All the known sugar cane troubles that we have in the state have been studied to some extent. the most of the time having been spent on the red rot disease. Much data on the methods of infection, the progress of the disease, and damage to the crop caused by this disease has been obtained and published as Experiment Station Bulletin No. 133.

Sclerotium Wilt Disease.—Many plants both cultivated and wild, are affected by a wilt disease due to a fungus known as *Sclerotium Rolfsii.* The fruiting stage of this fungus is unknown, but it undoubtedly belongs to the Basidiomycete group of fungi. Work on this trouble has included the listing of the plants affected, the relation of the disease to the fertilization of the soil, and the reaction of the fungus to different chemicals.

Tomato Wilt.—A single attempt to select a tomato resistant to the Fusarium tomato wilt was made with a most favorable result. The plants growing from the selected seed only showed about 10% of the wilt while the plants from unselected seed had over 50% of the wilt. Work on this selection will be continued to see if it is possible to improve the fruit and also maintain the resistant qualities.

Cotton-Seed Meal Poisoning.—With the Department of Animal Pathology, the study of the problem of cotton-seed meal poisoning has been continued. The work has included feeding experiments with cotton-seed meal and cotton-seed kernels, seed from different cotton varieties, cotton-seed affected with different boll rot fungi, and pyrophosphoric acid. Considerable data has been obtained which will be published in the early part of 1912 in bulletin form.

DEPARTMENT OF MECHANICAL ENGINEERING.

Prof. E. W. Kerr has continued his investigations previously reported under this head and has taken up certain new work as herein indicated.

During the early part of the year data obtained on the bagasse drying experiments at Palo Alto during the latter part of 1910 was worked up and issued in bulletin form. This bulletin was issued as No. 128 and contained some forty-two pages. During May and June experiments were carried on at Smithfield sugar factory for the purpose of gathering data relative to the economical burning of fuel oil. This work consumed about one month's time. The data gathered during these experiments has since been worked up and has been issued as Bulletin 131. During the summer vacation, an experimental evaporator was designed and has since been constructed by the John H. Murphy Iron Works Company of New Orleans. This evaporator has been installed in the mechanical engineering laboratory of the University. Some few experiments have been performed with this apparatus which have shown that it is well adapted for the work it was designed for, namely, the study of heat transmission and entrainment in vacuum evaporators under varying conditions. In addition to this, seven tests of evaporating machinery have been made in the Cinclare, Longwood, and Poplar Grove factories during the present grinding season. Three of these tests were made upon vacuum pans, two on a Kestner double effect, one on a standard double effect, one on a horizontal quadruple effect, and one on a horizontal triple effect. In all of these tests, the steam consumption and the water evaporated was measured, the object being to determine the economy of the different types under somewhat varying conditions. The data thus secured is now being tabulated. In addition to bulletins which have been worked up and issued during the year, Prof. Kerr has contributed several articles to sugar journals relative to the utilization of bagasse and oil as fuels, these articles being based largely upon experimental data secured in tests made heretofore under the auspices of the Experiment Station.

EXHIBIT AT STATE FAIR.

The Experiment Stations again made an exhibit at the State Fair at Shreveport. These exhibits result in increasing the interest of the public in the work that is being done by the

Experiment Stations and are the beginning of correspondence or the introduction of bulletins to interested farmers. We believe that a great service could be rendered in stimulating the improvement of agriculture in the state if a first-class exhibit could be arranged to send to every parish fair in the state. We hope in the near future that we may be able to undertake this plan.

LABORATORY FOR FEED STUFFS, FERTILIZERS AND PARIS GREEN.

During the past year, this laboratory made 1888 analyses of fertilizers, covering 7165 samples; 3404 analyses of feed stuffs, covering 10,399 samples; 106 analyses of Paris green covering the same number of samples; or 398 more samples were received than ever before. The number of analyses was not as great as last year, due to a decrease in the number of assistant chemists. It will be seen that the analyses in fertilizers approximated four samples for each analysis and in the feed stuffs three samples for each analysis. There is occasionally some complaint against compounding samples. Sometimes, this complaint is more or less justified and sometimes not. The compounding of samples may be carried to a point where we would be less liable to catch individual samples falling below the guarantee than if samples were less numerously compounded. On the whole, the analyses of the last year have shown that the Louisiana farmers are receiving materials as good as are on the market in other states. There have not been many instances in which the composition of either feeds or fertilizers has fallen below the guarantee. The published reports from this laboratory are used quite generally for reference both by the sellers of feed stuffs and fertilizers and by many of the large buyers, as the reputation of the manufacturer is practically portrayed in these reports. Many sales are made with the understanding that settlement will be made after the report of this laboratory has been rendered, the price being based on the unit of fertilizer or feed ingredient rather than on a flat price per ton. Of course, this is the most equitable basis on which to deal in these products, both from the viewpoint of the buyer and the seller, and it is to be hoped that this basis of conducting the trade may be extended.

I wish to call your attention to the financial statement and have you compare it with the financial statement of the two previous annual reports. You will note we have received only two-thirds as much money as we did in 1910 and only a little more than half as much as we did in 1909, which will explain to you why it has been necessary to cut down our laboratory force. We are at this writing considerably in debt. The Experiment Station staff and the Agricultural faculty are constantly striving to encourage the production of grain and forage crops sufficient to meet the entire demands for feed stuffs from Louisiana-grown products. This, of course, reduces to a considerable extent the taggage fees received from the sale of mixed feeds. In order that the fertilizer and feed control service may be most efficient, it is as important to keep up the analytical work as it is the inspection service and the distribution of revenues between the two departments should be such that the efficiency of both may be maintained. The number of inspectors and chemists should be increased or diminished on some regular basis so as to keep the work balanced. At the time the present plan was formulated it met all the requirements and was probably the best that could have been devised under the conditions that then existed. Conditions in the state have greatly changed, and it seems that we have advanced to a point where material change could be made to advantage as to the qualifications of the efficient inspector. A man taking samples of fertilizer or feed stuff today should have an intimate knowledge of the work of the laboratory and a reasonable amount of reliable information regarding the functions and elements of value in a fertilizer or feed stuff, and the source from which they are derived, and be able to impart this information in a serviceable way to the consuming public, and I should, therefore, recommend that a plan be devised by which most intimate relations could be maintained between the party who takes the samples throughout the state and the one who conducts the analyses.

Besides the annual publications on fertilizer and feed stuffs, Mr. J. E. Halligan, Chemist in Charge, sent in a paper entitled "The Composition and Feed Value of the Rice By-Products" to the meeting of the Feed Control Officials.

SPECIAL AGRICULTURAL TRAINS.

The Rock Island Railroad offered to operate a special train over their line for promoting increased interest in agricultural progress. The train consisted of five cars and a special crew. The train stopped at all important stations between Eunice and the Louisiana-Arkansas line. The train was out four days and had a total attendance estimated at about 14,500 people. This was followed up by a special car that spent fifteen days on the line, spending generally one day at a place, definitely taking up the organization of boys' pig clubs and more completely organizing the boys' corn clubs and otherwise stimulating interest in agricultural improvement. This car carried fine exhibits of corn and forage crops, with special information regarding the diseases of animals and plants, and information that would help combat the diseases, were prominent parts of the exhibits in the car. At most places where the car stopped, meetings were held from 9:00 or 10:00 o'clock in the morning until 5:00 or 6:00 o'clock in the evening, so that considerable systematized information could be given to those in attendance.

We are now planning for a completely equipped train carrying live stock, implements and all necessary demonstration material to be run over all the railroads of the state.

ADVERTISING CAR.

In September, 1911, the Experiment Stations installed a magnificent exhibit of Louisiana products in a 60-foot steel car of the Illinois Central Railroad for the purpose of advertising Louisiana's resources in the North. This car, with a similar one from Mississippi, was carried on a special train throughout the territory traversed by the main line and branches of the Illinois Central Railroad north of the Ohio River. The Director of the Stations accompanied this car the first two weeks of its tour and it was accompanied during the remainder of the tour by a representative of the State Board of Agriculture. This car was met with the heartiest interest everywhere. The attendance at the car reached from 1200 to 1500 people per day. A number of people, whose judgment is worthy of consideration, have said that this was the best advertising Louisiana has ever had.

PARISH FAIRS.

At a considerable number of parish fairs members of the Experiment Station staff acted as special judges of live stock and agricultural exhibits. The demand for judges trained in special lines of agriculture is, fortunately, becoming more and more pronounced, which is of itself an indication of the growth and improvement in the character of parish fairs.

FARMERS' SHORT COURSES.

Members of the Station staff have participated in the lectures given both at the Winter Short Course for Farmers at Baton Rouge and the Short Course given at Verda, in Grant Parish.

Station No. 3, North Louisiana Experiment Station

CALHOUN.

Mr. S. E. McClendon has continued as Assistant Director in charge of the work at this station. Field experiments have been largely a continuation of those requiring an extended period of time for their completion. They embrace rotation experiments, experiments in varieties of corn, cotton and forage crops, fertilizer requirements of standard crops, methods of cultivation, etc. The three-year rotation of corn and peas, followed by oats and peas, followed by cotton, that has continued for so many years is now attracting widespread attention, reference being made to the work in some of the best books on soil fertility. We have made a slight change in the rotation which I think will make the results far better than heretofore secured. In this rotation we have added crimson clover, planted in the fall after the cowpeas, and plowed under in the spring for cotton. Crimson clover besides adding nitrogen to the soil gives an abundance of humus which has a very beneficial effect upon the mechanical condition of the soil.

COTTON.

We have continued to test the varieties of cotton under weevil conditions with very satisfactory results the past season. Of ten varieties in this test the smallest yield was 1391 pounds of seed cotton per acre, Simpkins Prolific producing 1807 pounds of seed cotton on the same soil. In our experiments for the past three years, since the boll weevil reached maximum infestation, Simpkins cotton has stood at the head of the list in production.

CORN.

Experiments in varieties of corn have been confined to testing and comparing yields of some home-grown seed with some of the best varieties brought from other states. Our best results have been secured from home-grown varieties.

Experiments have been made in methods of cultivation, and, while the difference in yields have not been very great, what is known as the two-furrow system in North Louisiana has been the cheapest method, and has for the past two years made the most corn.

SUGAR CANE.

Seed cane was caught in the early freeze in the fall of 1910 and there was no special work in cane the past season.

STATION CATTLE.

The Red Polled cattle introduced on the Station a few years ago have done well and we have a number of young animals that speak well for Red Polls in North Louisiana.

SHEEP.

Sheep in North Louisiana have proven to be the most economical and profitable stock on the farm. The Station has a nice flock of sheep as a demonstration as to what can be done by taking the native ewes and breeding to pure-bred bucks. This experiment has continued for several years and has produced a sheep of excellent quality.

HOGS AND CROPS FOR HOGS.

During the past two years there has been a big demand on the Stations for information concerning the best crops to be grown, and the methods used in handling them most economically, in the production of pork. To meet this demand there has been a number of plots set aside for experiments along this line. Of the crops so far tested at this Station, we can recommend for the hill section of North Louisiana corn with cowpeas in the corn, soybeans, peanuts, sweet potatoes, oats and crimson clover. Better and cheaper gains have been secured when the hogs have been allowed to harvest these crops.

MEETING AT THE STATION.

The North Louisiana Agricultural Society has held regularly its monthly meetings at the Station, and much interest has been shown by the unusually large attendance.

CRIMSON CLOVER.

Crimson clover has been grown very successfully on the Station for several years, and is a crop that should be generally grown on the hill soils of North Louisiana. Last season it was demonstrated that we could grow the seed in Louisiana. A yield of from 7 to 10 bushels of seed per acre can be secured.

PURCHASE OF LAND.

Two tracts of land adjacent to the property of the North Louisiana Experiment Station were offered for sale the past year at a very reasonable price and, since we needed this property to make some of our own land available for cultivation and to straighten. out our boundary lines, we purchased approximately sixty acres at $10.00 per acre. This purchase will enable us to take up additional experiments that we could not have conducted otherwise.

NEW STATION RESIDENCE.

Early in the year the residence of the Assistant Director of the Station was burned to the ground, the building and contents being a total loss. The Assistant Director was unable to rescue any of the household property. A new residence has been erected at somewhat greater cost than the previous one. The building is not only handsome in appearance but well arranged and modern in every respect. We collected insurance on the old residence amounting to $2000.00. The new residence has cost about $3800.00.

Station No. 4, Rice Experiment Station

CROWLEY.

Mr. F. C. Quereau has continued in charge of this work and has made excellent progress in continuing the experiments established and getting the equipment for caring for them in good condition. The experiments outlined to be continued for a number of years cover a number of the most important problems confronting the rice planters of the prairie region, involving trial of different methods of eradicating red rice, which is a great pest to the rice planter, especially in Southwest Louisiana; question of rotation for the maintenance of soil fertility; the eradication of noxious grasses and weeds, and the fertilizer requirements for increased production and improvement in quality of grain. Some attention has also been given to trials of forage crops, sugar cane and root crops. While a good many of these crops have been shown to be not adaptable to conditions in Southwest Louisiana, a very considerable amount of information has been secured that will be helpful in planning experiments for the future. The season has been very adverse for most crops and yet some of the garden crops have given very satisfactory results, while others were complete failures.

The United States Department of Agriculture has continued to co-operate with us, enlarging somewhat the work done the previous year, in the study of varieties of rice and associated questions. Mr. J. M. Jenkins, from the Bureau of Plant Industry, has been constantly stationed at Crowley to look after these experiments, and Mr. C. E. Chambliss, in charge of the rice investigations of the United States, has devoted a considerable portion of his time also to this work.

Mr. E. S. Tucker, from the Bureau of Entomology of the United States Department of Agriculture, carried on at the Station throughout the summer investigations on the life history of the rice maggot and the rice beetle, getting considerable information that will be helpful to the planters. The results of some of these investigations have recently been published by the National Department and are available for general distribution.

During the past year we have erected at the station an excellent barn, which was very much needed, providing shelter and storage for farm animals and machinery. The irrigation plant is now practically complete to meet every requirement that may arise.

NEEDS OF THE STATION.

The Station is in need of funds to construct a residence on the grounds for the Assistant Director, and, also, we will soon need a small rice mill for testing out the character of grain to make our experiments complete. In the study of the influences of fertilizers on rice, the problem is only half solved when we learn the influence of the different elements on the quantity production of grain. There is a large variation on the amount of milled rice secured from a barrel of rough rice, and we have been unable up to the present time to tell very much about the influence fertilizers, or methods of irrigation or handling of the grain, would have on the milling quality. The average rice mill requires a large quantity of rice to make a test of milling quality, but we can have constructed a special mill that will give reliable data, using only a sack or so of rice for each test. Such milling equipment would cost in the neighborhood of $3500.00 to $4000.00. It ought to be provided at the earliest possible date.

NEEDS FOR THE ENLARGEMENT OF STATION WORK.

There is a rapidly growing demand for information not yet secured from the researches of the Experiment Station. The correspondence of the station is so heavy that quite a number of the staff give their time almost exclusively to this work. More liberal provision for the correspondence work and the enlargement of scientific investigations, would greatly increase the benefits derived from these investigations. The Stations ought to be able to carry on a lot of soil tests and crop tests on each type of soil found in the State, but we are not able to do this at the present time. Such tests extending over a number of years in twelve or fifteen different localities throughout the State would give an enormous amount of valuable information in regard to questions of soil fertility and proper fertilizers for farm and truck crops, the crops adapted to different soils or different portions of the State and rotation systems best suited for different types of soil. Special work ought to be done, also, looking to accumulations of reliable data regarding the reclaimed wet prairies and the cut over pine lands that differ essentially in character from the soils where the present stations are located. It would not be necessary for these test stations to take up scientific work and, therefore, would not be very expensive to operate after they were once put in condition for carrying on the work; $10,000 per year could be used to splendid advantage for the next few years in this line.

Financial Statement

(Receipts and Disbursements of All Funds.

The following is a copy of the statement already rendered to the Federal authorities, showing the receipts and expenditures of the Hatch Fund and the Adams Fund for the year ending June 30, 1911:

HATCH AND ADAMS FUNDS.

Dr.	HATCH FUND.	ADAMS FUND.
To receipts from the Treasurer of the United States as per appropriations for fiscal year ending June 30, 1911, under act of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By—		
Salaries	$12,275.17	$9,707.79
Labor	1,214.19	507.71
Publications	685.31	......
Postage and Stationery	84.02	24.51
Freight and Express	7.02	62.60
Heat, Water, Light and Power	137.50	539.36
Chemical Supplies	......	457.07
Seeds, Plants and Sundry Supplies	185.17	56.98
Feeding Stuffs	198.43	71.56
Library	1.00	87.13
Tools, Implements and Machinery	105.54	157.14
Furniture and Fixtures	......	113.75
Scientific Apparatus	......	2,403.33
Live Stock	......	164.15
Traveling Expenses	71.65	372.60
Contingent Expenses	35.00	1.00
Buildings and Land	......	273.32
	$15,000.00	$15,000.00

We, the undersigned members of the State Board of Agriculture and Immigration, to whom is entrusted the disbursement of the above funds, do hereby certify that we have examined the accounts of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the fiscal year ending June 30, 1911, and have found the above classification to be correct, and the receipts for the time named are shown to be $15,000 for the Hatch Fund and $15,000 for the Adams Fund, and the corresponding disbursements are $15,000 for the Hatch Fund and $15,000 for the Adams Fund, for all of which the proper vouchers are on file, and have been examined by us and found to be correct.

(Signed) E. O. Bruner,
Commissioner of Agriculture and Immigration.
(Signed) Henry L. Fuqua,
Vice-President of the Board of Supervisors of the Louisiana State University and Agricultural and Mechanical College, and Ex-Officio Member of the State Board of Agriculture.

The following is a combined statement of the receipts and expenditures from December 1, 1910, to November 30, 1911, of funds other than those secured through Federal appropriations, statements covering same having been reported to the State Auditor after the accounts and vouchers for the above period had been examined and found correct by the Supervisor of Public Accounts:

STATE FUND.

Dr.

Received from the State Treasurer	$26,541.70
Received from Sale of Farm Products, etc	4,737.98
Payment of Accounts, Fertilizer and Feed Stuffs	3,000.00
Received from United States Mortgage & Trust Co., Insurance on Residence at Calhoun	2,000.00
Deficit November 30, 1911	2,777.83
	$39,057.51

Cr.

Salaries	$ 7,332.90
Labor	7,653.78
Publications	486.10
Postage and Stationery	418.38
Freight and Express	464.97
Heat, Water and Lights	506.14
Chemical Supplies	41.68
Seeds, Plants and Sundries	1,865.18
Fertilizer	463.20
Feed Stuff	2,103.75
Library	55.62
Tools, Implements and Machinery	1,027.80
Furniture and Fixtures	15.10
Live Stock	463.00
Scientific Apparatus	180.00
Traveling Expenses	1,061.18
Contingent Expenses	4,388.26
Building and Repairs	7,648.77
Deficit November 30, 1910	2,881.70
	$39,057.51

Seattle Public Library

FERTILIZER AND FEED STUFF FUND.

Dr.	
Received from Commissioner of Agriculture	$14,500.00
Deficit November 30, 1911	2,301.88
	$16,801.88
Cr.	
Salaries	$ 7,816.37
Labor	743.51
Publications	583.82
Postage and Stationery	325.04
Freight and Express	37.90
Heat, Water and Light	436.65
Chemical Supplies	973.48
Seeds and Sundries	120.58
Fertilizer	28.00
Library	13.68
Tools, Implements and Machinery	50.96
Furniture and Fixtures	10.75
Scientific Apparatus	3.70
Traveling Expenses	110.15
Contingent Expenses	64.96
Building and Repairs	292.44
Expense of Experiment Station Accounts	3,000.00
Deficit November 30, 1910	2,189.89
	$16,801.88

The books and vouchers for all these accounts have been examined and approved by the Supervisor of Public Accounts and report rendered to the Vice-President of the Board of Supervisors.

Very respectfully,
(Signed) W. R. Dodson,
Dean and Director.

Publications Issued During 1911.

Twenty-third Annual Report.
Bulletin 125, Bacterial Deterioration of Sugars.
Bulletin 126, Diseases of the Fig Tree and Fruit.
Bulletin 127, Sugar Cane Seedlings.
Bulletin 128, Bagasse Drying.
Bulletin 129, Cane Syrup Making.
Bulletin 130, Lespedeza.
Bulletin 131, Oil Burning in Boiler Furnaces.
Bulletin 132, Method of Treating Arsenical Solution Before Emptying Dipping Vat.
Bulletin 133, The Red Rot of Sugar Cane.
Report of Analyses of Commercial Fertilizers and Paris Green for Season 1910-1911.
Report of Analyses of Commercial Feed Stuffs for Season 1910-1911.

TWENTY-FIFTH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATIONS

OF THE

Louisiana State University and Agricultural and
Mechanical College

FOR 1912

TO THE GOVERNOR

By W. R. DODSON, Director

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR LUTHER E. HALL, *President.*
T. JONES CROSS, *Vice-President of Board of Supervisors.*
E. O. BRUNER, *Commissioner of Agriculture and Immigration.*
THOMAS D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS.

HENRY GERAC, Lafayette.
JOHN J. HENDERSON, Lagan.
JEFF D. MARKS, Crowley.
JOHN T. COLE, Monroe.
R. E. THOMPSON, Wilson.
J. E. BULLARD, Belmont.

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
FRIEND C. QUEREAU, M. S., Assistant Director, Rice Exp. Station, Crowley.
W. E. CROSS, Ph. D., Chemist, Audubon Park, New Orleans.
WM. L. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
J. K. McHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
J. E. HALLIGAN, B. S., Chemist, Baton Rouge.
A. P. KERR, M. S., Assistant Chemist, Baton Rouge.
G. D. CAIN, B. S., Assistant Chemist, Baton Rouge.
J. M. JENNINGS, B. S., Assistant Chemist, Baton Rouge.
S. BYALL, B. S., Assistant Chemist, Baton Rouge.
I. SELECTER, B. S., Assistant Chemist, Baton Rouge.
ROGER P. SWIRE, Treasurer, Baton Rouge.
J. B. GARRETT, B. S., Entomologist, Baton Rouge.
E. S. TUCKER, Associate Entymologist, Baton Rouge.
G. L. TIEBOUT, Horticulturist, Baton Rouge.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
E. W. KERR, M. E., Professor Mechanical Engineering, Baton Rouge.
HARRY MORRIS, D. V. M., Assistant Veterinarian and Bacteriologist, Baton Rouge.
MRS. E. L. STRONG, Secretary and Stenographer, Baton Rouge.
MISS M. FLOWER, Mailing Secretary, Baton Rouge.
A. J. PARENT, Farm Manager, Baton Rouge.
E. J. WATSON, Horticulturist, Calhoun.
C. H. STAPLES, B. S., in charge of Dairy, Baton Rouge.
MISS C. JACOBS, Scientific Assistant in charge of Seed Laboratory, detailed by U. S. Dept. of Agriculture.

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE.
Office of Experiment Stations,
Baton Rouge, La., January 15, 1913.

To His Excellency, Luther E. Hall,
Governor of Louisiana:

Sir—In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 2, 1906, known as the Adams Act, providing for Federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1912 and a financial statement for the government fiscal year, July 1, 1911, to July 1, 1912.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of Federal funds, so as to show the total receipts and expenditures for twelve months. The accounts have been examined and approved quarterly by the Supervisor of Public Accounts.

I have had the research members of the staff submit reports, and I have used these in the preparation of my report, sometimes making material condensation of statement and sometimes quoting verbatim without designating the portion that is the exact language of the party writing the report to the Director.

Very respectfully,
W. R. Dodson,
Director.

Station No. 1, Sugar Experiment Station

Audubon Park, New Orleans, La.

By W. G. Taggart, Assistant Director.

The supervision of the Sugar Experiment Station continued under the direction of Mr. S. G. Chiquelin until October 6th, 1912, when he accepted a position as general superintendent of a sugar company in Mexico, at a much greater salary than we could pay. After his departure the duties of Acting Assistant Director were entrusted to Mr. W. G. Taggart.

The field work on sugar cane has been carried on under three distinct parts: (1) Experiments tending to show the merits of different fertilizing materials when used alone and when combined. (2) Testing foreign varieties of sugar canes when grown under Louisiana conditions. (3) Propagating, growing and testing canes from seed.

Many of the old experiments in fertilizers have been discontinued and in their stead a new series of experiments taken up with the view of contrasting the influence of nitrogenous fertilizers. This embraces some new forms of nitrogen now becoming popular that were not available when the old series of experiments were planned. It seems that the results thus far would indicate that though there are substances associated with some of these nitrogenous fertilizers which are poisonous to animal and plant life, the detrimental effect is not apparent when used as a fertilizer; on the contrary, the growth of the cane has seemed to be more vigorous where these fertilizers have been used.

The potash experiments in combination with nitrogen as a fertilizer for cane have now been running through three years. Although our soils are rich in potash, it has seemed to many that a cane harvest makes such a heavy draft on this component of the soil that it might not be available as rapidly as the growing crop would require it for maximum yields. The results so far have not been conclusive, and of necessity the experiments must be continued for a long series of years.

A third plot was a continuation of experiments of many years, nitrogen in form of tankage, and cotton-seed meal was applied with acid phosphate. First, using one part of nitrogen to one part of phosphate, and, second, using one part of nitrogen to two parts of phosphate; and, in addition to this, an experiment was made using calcium cyanamid with acid phosphate in comparison with the other nitrogenous fertilizers. Here again the results of a long series of years must be accumulated before conclusions should be drawn.

FOREIGN VARIETIES OF SUGAR CANE.

We have one hundred and forty-eight varieties of cane which were imported from Demerara, Porto Rico, Trinidad, Japan, China, Mexico, and Java. While some of these are fairly good, none have proved promising enough to justify our planting them in very large acreage.

SEEDLINGS.

We are paying especial attention to the work of propagating Louisiana seedlings, and now have 385 varieties of our own germination in our field. During the year seed were received from the Experiment Station, Mayaguez, Porto Rico; J. R. Bovell, Bridgetown, Barbados; Hawaii Experiment Station, Honolula, T. H.; F. Evans, Botanical Department, Trinidad; J. B. Harrison, Georgetown, Demerara; S. M. Bowman, Ganahl, Mexico; Estacion Experimental, Santiago de las Vegas, Cuba; Department of Agriculture, Kingston, Jamaica; Experiment Station, Pasoeroean, Java; and from Dr. F. Miles, Fort Myers, Florida.

The seed above mentioned were put out in our propagating rooms. After many of the seed had germinated, and we had a good number of new varieties, disaster overtook us in the form of the April hailstorm which destroyed a majority of the plants. We still have twenty varieties which have been transplanted to our plats, and thirty-eight in the Horticultural Hall. Also, we are working with the seed from Florida, and hope to secure seedlings from seed grown on the American continent. It is very gratifying to know that some of the best varieties are still yielding results which are even a little better than the D. 74

cane. These varieties have been planted in larger areas, and in the near future we expect to have enough cane from them to draw definite conclusions, and to distribute among our planters.

During the harvest season the station has been called upon to ship cuttings of its best varieties to points in Louisiana, Florida, Texas, Kentucky, Ecuador, and Brazil.

MISCELLANEOUS.

One cane harvester, owned by G. D. Luce, is now on our grounds and will be tested out after January 1, 1913. Two others, owned by C. E. Platt, and Mr. Cockrell, have been tried out on the plantations. They have brought forth some favorable comment.

The regular practical course of the Audubon Sugar School was given in the sugar house and laboratories. A new feature in which much interest was shown was a short course in bacteriology and fermentation, under W. L. Owen. The class consisted of nineteen fourth and fifth year students.

The Federal Bureau of Entomology, in co-operation with the station, has done good work. Mr. T. E. Holloway has been very active in his work on cane insects, and has found parasites combating the ravages of the cane borer. Mr. E. R. Barber has written several pamphlets on the Argentine Ant, Laphygina and X-ray experiments.

The station has continued to grow a series of forage and fibre crops that have been of more or less interest.

The olive trees maintained on the station for quite a good many years have all been destroyed. It seemed that we had sufficient indication that olive growing could not be made a profitable industry on account of the great uncertainty of the trees bearing.

Quite extensive repairs have been made in the sugar house by the aid of a special appropriation made by the Legislature of 1912. Also, we have extended the city water supply to the laboratories and have installed electricity, lighting the sugar house and laboratories from the city plant. These improvements have greatly added to the comfort of the office and laboratory work of the station.

CHEMICAL DEPARTMENT.

The work of the Chemical Department, under Dr. Wm. E. Cross, has shown much progress during the past year. The investigations have been continued in the two main directions previously outlined, viz., clarification of the juice and syrup, and the more accurate analysis of sugar cane and its products. The following is the report of Dr. W. E. Cross:

The investigations along the lines of methods of analysis have been completed, and published in Bulletin 135. The work included research in accurate and practical methods for the analysis of molasses, syrups, etc., and a new method of direct determination of sucrose in presence of reducing sugars. Several other important aspects of sugar house control were worked out, for particulars of which reference should be made to Bulletin 135 referred to above.

The work on clarification and other aspects of the sugar manufacturing process was continued with much success. A modified double carbonatation process, as well as an efficient process of single carbonatation, was perfected as far as possible for Louisiana juices, and it was shown that a very good grade of white sugar could be made by this process. The question of alkaline clarification (liming before sulphuring) was further studied, and it was shown that this method is probably better for green or soured cane, although probably less convenient for Louisiana conditions than the sulphur-lime process ordinarily in use. An important study was also made on the sulphitation and clarification of syrups. This matter is very important to the manufacturer of high-grade consumption sugars and our results on this work promise to be of considerable technical interest.

The question of the occurrence of inversion in sugar house work also came under investigation, the work being planned to show exactly what degree of acidity could be used with safety in sugar manufacture. It is intended to publish a complete report of this work in a short time.

During the year 79 miscellaneous analyses (soils, fertilizers, cane, molasses, etc.,) were made by the department.

The referee work on sugar and molasses for the Association of Official Agricultural Chemists of the United States was again assigned by that body to this station, Dr. Wm. E. Cross being referee for the third successive year. This work on analytical methods is planned each year by the referee, who secures the co-operation of prominent authorities in different parts of the country in testing out the methods worked upon. This year several new methods which had been worked out by this department (see Bulletin 135) were tested in this way, with gratifying results.

DEPARTMENT OF BACTERIOLOGY.

As designated in the last annual report Mr. W. L. Owen was given a leave of absence from the fall of 1911 to the summer of 1912, during which time he pursued his investigations under the direction of Dr. Koch in Berlin, Germany, returning to the Sugar Experiment Station the first of September, 1912. The following report is rendered by W. L. Owen on his work:

The investigation of the bacterial deterioration of sugars commanded the greater part of the attention of this department during the period embraced by this report. Some attention has been given to problems closely related to the main research project of the department but such work has been of a preliminary character looking to future lines of research. Among the most important of these preliminary researches may be mentioned the investigation of the influence of the addition of various substances upon the fermentation of Louisiana molasses and the causes of gum formation by various cultures of yeasts.

The work on the deterioration of raw sugars has consisted partly in the repetition of certain of our formerly conducted experiments with modified methods of analytical determinations, and partly to a continuation of experiments on the inoculation of raw sugars. The vicometric method was substituted for the alcoholic precipitation method of gum determination and gave highly satisfactory results. Experiments on the influence of acidity upon the formation of gum by the bacteria of sugars were repeated with the difference that in this case organic acids were employed instead of sulphuric in furnishing the desired acidity of solutions. In these experiments varying percentages of malic, tartaric, acetic, and lactic acids were used, and their relative influences compared. Although the results showed a difference in the reaction of the organisms to the different acids used, yet the general action of these acids did not differ materially from that of sulphuric in that the gum formation was retarded by acidity and accelerated by neutral or slightly acid solutions.

Much attention has been given to the perfection of some method for the determination of gum in sugars. Of the various methods thus far tried the one that has given most promise is that of dialyzing the sugar to be tested through a collodial membrane which is permeable for the sugar, but which intercepts the passage of gums. It is believed that perhaps a modification of this method may prove successful in the detection of levan in those sugars in which it occurs to any appreciable extent.

The experimental work upon the influence of invertase on the gum fermentation of sugars has been repeated with pure invertase as the inverting agent instead of yeast cultures as was employed in our former experiments. The results of these experiments show that in the presence of invertase the developmnt of gum by the bacteria is decreased in direct proportion to the amount of inversion of sucrose due to the invertase, which confirms even more conclusively our theory of the direct formation of gum from sucrose.

Much attention has also been devoted to the comparison of various culture media as a means of estimating the bacterial content of raw sugars. Quite a number of culture media of varying compositions were employed and their relative merits compared. It was found that sucrose agar gave better results than peptone agar, both in the aggregate of colonies developing during the incubation period, and in the promptness with which the maximum growth was attained.

The influence of the moisture content of raw sugars on their rate of deterioration has received much attention, a series of experiments having been conducted on the acceleration of the rate of deterioration of sugars by the addition of varying percentages of moisture. The influence of moisture on the development of bacteria in sugars has also been noted.

During the past grinding season at the station two series of investigations were begun, the purpose of which was to establish certain scientific principles that should govern the bacteriological control of sugar houses. One of these investigations was that of a thorough comparison of various culture media as a means of estimating the bacterial content of the various sugar house products. In these experiments the raw juice, clarified juice, molasses, syrups, massecuite and sugars of three separate runs of the sugar house were collected in sterile containers and plated out upon the following culture media: Sucrose, Peptone, Raw Sugar, Raw Sugar Peptone, Raw Juice, Raw Juice Peptone, Molasses, and Molasses Peptone Agar. The comparative merits of these media for the various products investigated were duly noted.

The other investigation was a comparison of a number of commonly used germicides as regards their efficiency in the elimination of micro-organisms from the sugar house. The germicidal agents under investigation are Milk of Lime, Formaldehyde, Lime and Carbolic Acid mixture, Bisulphide of Lime, Potassium solution, Ammonium Fluoride, and Sodium Hydrochloride. The products upon which these agents are being used are fermented juices, and molasses. The plan is as follows: The highly infected juice or molasses is placed in wooden containers in which it is allowed to remain for several hours, after which time it is emptied and sterile water poured in. A bacterial count is then made of the number of bacteria in the water, and then one of the germicides is used and another count made after the agent has been allowed to act for the required period. The relative efficiency of the various germicides can in this way be established.

With a view of renewing our supply of sugar samples used in the investigations of this department, letters were sent out to various planters requesting their co-operation in the matter. The number of offers to donate the required material, and the promptness with which the planters responded to our requests was highly gratifying, and the great variety of samples that we have received will prove of great value in our investigations.

Station No. 2, State Station,

Baton Rouge.

The office of the Director is maintained on the campus of the Louisiana State University. All bulletins are issued from this station and the laboratory for the analysis of fertilizers, feedstuffs and Paris green for the State Board of Agriculture and Immigration is also located here. The work of the several different departments is herein summarized.

FIELD WORK.

The field work, covering experiments in the use of fertilizers, rotation of crops, forage crops, fiber crops, miscellaneous and medicinal plants, has been continued along lines outlined in previous reports.

During the year a number of shipments of ramie stalks were made to two inventors in the East who are working on a ramie decorticating machine. This work has resulted in a request from the Federal Department of Agriculture, Division of Fibre Crop Investigations, that we plant two acres in ramie for 1913 with a view of having a small mill constructed on the grounds here for running tests under the joint supervision of the U. S. Department of Agriculture and the local station. Arrangements are being made to try out this crop on this quantity of land.

The field experiments in grazing hogs have confirmed results previously gotten on the same line, some of the fields practically duplicating results published in Bulletin 124 of this station.

During the year the University purchased sixty acres of land adjoining the Experiment Station grounds on the north, which can be devoted very largely to experimental purposes and will enable the station to take up field experiments that we were previously unable to conduct on account of lack of suitable land

DAIRY FARM.

The dairy farm of eighty-seven acres, southeast of Baton Rouge, has been further improved.

A public dipping vat was constructed on the farm the past year and several thousand cattle have been dipped there during the summer, so that this has been an important factor in helping to diminish the number of cattle ticks in the community. A great many cattle that were driven out from the west side of the river by the overflow water were dipped before they were returned to the west side, so that they went back free of living ticks.

A public dipping vat was also constructed on the grounds of the Experiment Station proper, and about si xthousand cattle were dipped there during the summer and fall.

EXPERIMENT STATION DAIRY.

The dairy work has been continued very much along the same lines as indicated by previous reports, under the management of Mr. C. H. Staples. Quite a number of young cows of our own raising are now coming to milk and are showing every evidence that we will soon have quite a number of cows of high producing power that have been raised on the grounds. The herd is now reaching a number that we will have to restrict from further increase by selling off the progeny so as to prevent accumulating more animals than we now have. Results again emphasize the value of silage, root crops and green pasturage for an abundant flow of milk, especially in the winter time.

HORTICULTURAL DEPARTMENT.

Mr. Geo. L. Tiebout has continued to devote his entire time to this department. During the year he has grown commercial quantities of egg plants, peppers, and other perishable spring and summer crops, shipping to the northern and eastern markets, and as a fall crop he has grown something over five acres of cauliflower with very satisfactory results. Part of the work that Mr. Tiebout has in hand is shipping vegetables to the different portions of the country and tabulating data on the carrying quality to distant markets, and relative returns after deducting express and commission charges. The department has given assistance to other departments in their work in helping to provide material for experimental purposes and for carrying out practical demonstrations in the control of plant diseases.

DEPARTMENT OF VETERINARY SCIENCE AND ANIMAL PATHOLOGY.

Dr. W. H. Dalrymple has had a very large part of his time taken up in correspondence in consultations and serving as a member of the Live Stock Sanitary Board, particularly giving attention to the work of eradication of the Texas fever cattle tick. Various other duties have been performed by him. He has been especially successful in organizing branches of the Tick Eradication League and in securing the construction of dipping vats in parishes where the Live Stock Sanitary Board has not actively taken up the work of tick eradication.

Dr. Harry Morris has continued his investigations on anthrax and cotton seed meal poisoning throughout the year. The results of the anthrax work are published in Bulletin No. 136, just now coming from the press. The work on cotton seed meal poisoning, carried on in conjunction with Dr. C. W. Edgerton, will have to be continued for another year, though considerable valuable data has been accumulated.

DEPARTMENT OF PLANT PATHOLOGY.

Dr. C. W. Edgerton renders the following report of his work for the year:

Bean Diseases. The study of the two bean diseases, the blight and the anthracnose, has been continued. These diseases have been under observation for a number of years and their courses of development are quite thoroughly known. The work of the past year has been mostly along the line of prevention. It has been found that the anthracnose can be entirely controlled by the use of home-grown seed, especially seed that is grown in the fall. While we have found no method that will control the blight entirely, we have been able to reduce it to a remarkable extent by seed treatment. Treating the seed before planting with corrosive sublimate or benetol kills the bacteria that are on them and reduces the chances of infection in the field. The results of the work on these diseases are to be published in bulletin form in the early part of 1913. If the recommendations of this bulletin are followed, it is believed that the truckers will have much less trouble with these diseases.

Cotton Boll Rots. The study of the cotton boll rots has continued through the year and the work has been practically completed, except to further test practical application of information resulting from the investigation. The results of the five years work on these troubles were published as Bulletin No. 136 in December, 1912. Some articles on these troubles were also published in scientific journals during the year.

Sugar Cane Diseases. Much time was given to the study of the sugar cane diseases during the year. The red rot and the stem rot have been carefully studied; the latter disease has not previously been recognized in the state. The stem rot disease, caused by the fungus, *Gnomonia iliau,* has evidently been confused with the root rot diseases in the past. The fungus has been studied and its life history worked out. The disease is especially severe in the northern part of the state where the farmers bed their seed cane for the winter. The fungus develops in the beds and infects all the cane. Some attention has also been given to the rots of seed cane. Part of the poor germination in the state seems to be due to the action of certain fungus parasites. The work on all of these troubles will be continued during the coming year.

Tomato Wilt or Blight. The tomato wilt is very destructive in parts of the state and an attempt was made to select a variety or strain that is resistant to the disease. We have been able to select a strain from the common Acme tomato that has this characteristic. The plants of this strain often bear until frost, while common plants die just as they begin bearing. The wilt resistant tomato is not as early as desired, however, and an attempt is being made to obtain some hybrids that will not only be wilt resistant but also early. Crosses were made with the Earliana in the spring and seed obtained. Some of these seed were planted in the fall and seed of the first generation obtained. An attempt is being made at present to grow a generation in the greenhouse during the winter. If we are able to mature the seed before planting time, we will have grown three generations in a year. By doing this much time is saved. We shall be able to have plants of the third generation to work with the first year after the crosses were made.

Damping Off Diseases. A study of the fungus Rhizictonia was commenced several years ago in connection with an alfalfa disease. We have since studied the disease it produces in a number of other plants and will continue to do so.

Besides the diseases mentioned in the above paragraphs, some attention has been paid to the *Sclerotium Wilt Disease,* the *Cotton Wilt,* the *Eggplant Blight,* and also to a general survey of the diseases of the state.

The study of the problem of cotton seed meal poisoning has also been continued during the past year. A portion of the results obtained were published in bulletin form during the year, Louisiana Bulletin No. 134.

Besides the two bulletins mentioned above, the following articles have been published in scientific journals during the year:

Flower infection with cotton boll rots. Phytopathology 2: 23-27, 1912.

Botryosphaeria on cotton bolls. Mycologia 4: 34-36, 1912.

The Melanconiales. Trans. Amer. Micros. Soc. 31: 243-265, 1912.

ENGINEERING DEPARTMENT.

The work of this department has been continued under the directions of E. W. Kerr, Professor of Mechanical Engineering.

The following is a report of the work done on sugar house investigations during the past year under the Adams Fund. The investigations have been made for the purpose of determining heat transmission in vacuum evaporators and other sugar house heating apparatus. This work has been carried on by means of tests on a specially designed single vacuum evaporator installed in the mechanical laboratory of the University and by tests made upon the evaporating and heating apparatus in the sugar factory of the Adeline Sugar Factory Company, Adeline, Louisiana. This factory has a maximum capacity of 1,500 tons of cane per 24 hours. The tests upon the laboratory apparatus were made in order to study heat transmission as affected by height of boiling, temperature level, air in the heating steam or vapor, density of steam, density of juice or syrup, quality of steam (wet or superheated) dimensions of tubes, downtakes, also entrainment as affected by the rate of boiling, height of boiling, velocity of the vapors leaving the boiling surface, height of vapor space, and length and diameter of tubes. A large number of tests were made upon this apparatus during the months of June, July, and August of the present year, a total of 167 tests. Since that time the data from these tests have been worked up and embodied in Bulletin 138, which will be finished by the printers within a few days. This bulletin contains in the neighhood of seventy-five pages of matter and sixteen illustrations.

The tests upon the evaporating and heating apparatus of the Adeline sugar factory were made for purposes similar to those named above for the laboratory apparatus. These investigations included tests upon the vacuum pans, quadruple evaporators, mill juice heaters, clarified juice heaters, syrup heaters, and granulators. In the tests on each of these machines observations sufficient for heat balance determinations were also made. With the data secured in these tests it is expected that deductions can be made regarding the transmission of heat under regular working conditions. In addition to the tests of the evaporating and heating apparatus in this factory, power tests of the engines and pumps of the houses were also made for the purpose of making a complete heat balance of the factory. The data secured from the Adeline factory are now being worked up and a report will be embodied in a bulletin. In this bulletin will be included other data secured in tests upon sugar house machinery in 1911. The tests upon the experimental evaporator in the laboratory were made by the writer assisted by Messrs. A. J. Isacks, A. Guell, and W. P. Denson. The work of preparing Bulletin 138 was done by the writer assisted by A. J. Isacks. The tests at Adeline, which were made during the last grinding season during the months of November and December, were made by the writer, A. J. Isacks, H. A. Nadler, and B. J. Beranger. Mr. Nadler, though an employee of the Guanica Sugar Company, was, through the co-operation of the managers, detailed to assist in the tests without cost to the Experiment Station. Mr. Beranger is a graduate student in the Audubon Sugar School of the University.

I also wish to call attention to the co-operation of the Ohio Blower Company, which loaned a 10″ separator used in the laboratory experiments for separating entrained sugar juice from the vapors leaving the evaporator; the Harrison Safety Boiler Works, which loaned an oil separator of its make for the same purpose; the Builders Iron Foundry, which loaned three Venturi meters used in the tests at Adeline; and the Sanborn Evaporator Company, which constructed a calandria of the type manufactured by them to fit the experimental evaporation plant with which the experiments recorded in Bulletin 138 were made. This latter apparatus, which was quite expensive, will be of great value in further experiments regarding the effect of air and other incondensible gases upon heat transmission. To all of these the station is largely indebted. Further work upon the laboratory apparatus will be carried on during the balance of the year.

The following articles have been published in the *Modern Sugar Planter:*

SUBJECT	NO. OF ARTICLES
Factors Affecting Fuel Records in Sugar Factories	10
Bagasse Drying	5
Grate Surface for Bagasse Furnaces	2
Steam Piping in Sugar Factories	2
Heat Losses	1
Steam Turbines	1
Cane Milling	6

Many of these articles have been reprinted or abstracted by foreign sugar and engineering publications.

DEPARTMENT OF ENTOMOLOGY.

January 1st, 1912, Mr. E. S. Tucker was added to our staff to give his entire attention to entomological work, relieving Mr. J. B. Garrett, who was devoting half of his time to this work. Mr. Tucker has devoted his time to a study of insect injury to stored rice. The following is his report of the progress of the year's work:

Satisfactory progress has been made in determining the life history of the principal species of insects injuring stored rice, and practical methods for their control. Results are being prepared for publication. The need for investigations in this line arose from frequent appeals made in former years by the milling companies and warehouse owners dealing in rice at various places in Louisiana, requesting information as to the best means of suppressing insect pests and preventing an extensive loss which they caused every year by attacking stored rice and its by-products. During 1911 and 1912 less rice was stored and complaints of insect damage have been few.

Since the methods and conditions under which rice is stored and milled differ from the handling of other grain, and owing to the distinct nature of rice itself, the usual methods employed for control of insects in ordinary grains were found unsatisfactory in attempting to restrain infestations of insects in rice stored in the mills and warehouses. Although the pests were found to be common grain insects, yet very little was known about their development and habits. On account of the importance of obtaining some practical measures for the control of the pests, action was taken instituting an investigation conducted on the following lines:

(1) A study of the life history, habits, relative abundance, hibernation and parasites of the species infesting both clean and rough rice in storage, and the relation of stored by-products and warehouse sanitation to the increase and abundance of the insects.

(2) The resistance of the species in their different stages to the action of hydrocyanic acid gas, sulphur fumes, carbon bisulphide, heat and cold under known conditions of space, temperature, pressure, time, moisture and dosage.

After visiting mills and warehouses in New Orleans, Donaldsonville, and Crowley, at which places collections of infested rice were obtained, as many as 16 species of insects were found infesting rice and its by-products. A list of their scientific names need not be given here, but it includes 9 species of beetles, 2 species of moths, 3 species of rather obscure forms, and 2 species of mites. Then, in addition some parasites and predators have appeared as enemies of certain pests.

To work out the complete life history of all these species presented quite an undertaking. The first need being a knowledge of the more important kinds, these were accordingly selected for study.

The rice weevil (*Calandra oryza*) is one of the most prevalent destructive pests, evidently preferring milled rice, either whole or cracked, but it also occurs in unhulled grain. Its methods of attack and development have been carefully studied. Probably the most damage to rough grain is caused by the lesser grain borer *(Rhizopertha dominica)*, whose only visible sign of injury is a small hole which the beetle cuts when it emerges from a grain. The Angoumois grain moth *(Sitotroga cerealella)* also seems to prefer rough grain in which to breed, and the worm feeds and develops within the grain in a manner similar to the grain borer.

The cadelle *(Tenebroides mauritanicus)* is not believed to injure whole grains, but will live in ground products or in accumulations of dust among bags of rough rice. It has shown a tendency to prey on the real destructive pests and in fact will devour one another. Attempts to breed the rust-red flour beetle *(Tribolium navale)* have failed to show that it does any appreciable injury to whole grains, but it seems to depend upon finding crushed or powered products in which to breed.

Fumigation experiments conducted by Mr. J. B. Garrett were made in special tight chambers, using carbon bisulphide, hydrocyanic acid gas, and fumes of burning sulphur, but the power of penetration of these agents into bags of rice was found insufficient to kill insects buried deeply in the grain. Heating of rice at a temperature of 120° F. killed all insects, but caused the grain to fracture and therefore had to be abandoned.

Placing rice in cold storage through the warm months of the year has been found to be an effective means of protecting stock from insects. Owing to the expense, however, the rice companies store only the choice grades in this manner. General cleanliness around mills and warehouses and the prompt disposal of refuse material have shown their value by lessening the abundance of insects.

Believing that a substantial grade of bagging would serve to protect perfect rice from becoming infested by insects, Mr. Garrett prepared material for a bagging test. The outcome after fourteen months subjection to badly infested stock resulted as follows: In a bag made of fine drilling, the rice was slightly infested and damaged. In a bag made of 8-ounce duck, scarcely an insect or evidence of one could be found among the contents. But the grain kept in a 10-ounce duck bag passed through the test in absolutely perfect condition, which appeared remarkable considering the extreme infestation of grain surrounding this bag as was also the case with the others. These results afford the nearest solution of the problem of checking insect pests, and the simplicity of the method is much in its favor.

Owing to the small amount of stored rice which was carried through the past season, a scarcity of insects naturally resulted. Should the time come when large stocks of rice are held in storage from year to year, then we will likely be called on for advice concerning means of controlling the infestations by insects.

A number of popular and scientific contributions have been submitted for publication during the year. The ones that have appeared under the authorship of Mr. E. S. Tucker are the following:

Value of Entomological Investigation (Farm and Ranch, v. 31, No. 13, March 30, p. 8).

Beware of the Fly (Farm and Ranch, v. 31, No. 16, April 20, pp. 6 and 7).

The Rice Water-Weevil and Methods for Its Control (U. S. Dept. Agri., Bu. Ent., Cir. 152, issued July 10, 2 figs., pp. 20).

The following was prepared by Mr. Garrett:

Treatment for Worms Injuring Corn (Press. Cir., La. Agri. Exp. Sta., June, 3 pp.).

SEED-TESTING LABORATORY.

The Seed Laboratory of the United States Department of Agriculture established a branch laboratory at this station and Mr. J. M. Moss was assigned to duty here. The basis of co-operation was to the effect that the U. S. Department of Agriculture should furnish a trained botanist to make determinations of purity and tests of germination of all farm and garden seeds that might be sent in by the farmers of the state and the states adjacent to Louisiana. This station was to furnish laboratory space, heat, gas and light and such stenographic assistance as was necessary.

Circulars were sent out advertising the establishment of the Seed Testing Laboratory and some farmers sent in seed for purity and germination test, though the laboratory was not utilized to the full extent that we expected it to be. The laboratory was closed during the summer, and on the first of November was reopened, with Miss Cora Jacobs, a graduate of the University of Illinois, in charge. We have been making an effort to get the work before the farmers with the hope that they will avail themselves of the opportunity of having their seeds tested free of charge. It is a matter of very great importance, and even should the laboratory not be worked to the full capacity, it will have a most beneficial effect in deterring unscrupulous parties from putting inferior and adulterated seed on the market, from the known possibility of having these seeds tested here and the results published.

LABORATORY FOR FEEDSTUFFS, FERTILIZERS AND PARIS GREEN.

The work of the laboratory for the year 1911-12 has been of about the same volume as for the past few years. The following is the report of Mr. J. E. Halligan: For 1911-12, 2,322 analyses of fertilizers covering 6,989 samples; 2,829 analyses of feedstuffs covering 9,866 samples, and 178 analyses of Paris green covering the same number of samples were made. The above figures show the great amount of work that was performed by this laboratory. We make perhaps more analyses of these commodities than any other laboratory of its kind in this country. Some states have much larger tonnage than Louisiana, but there is a great deal more work done per man, and for less money, in this laboratory than in any other state.

Practically all of the time of the chemists is taken up with the performance of the work connected with fertilizers and feedstuffs. Occasionally when we have a little time we make miscellaneous analyses for the farmers. However, the force has very little time for this kind of work.

The laboratory has been used more for the past year as a trade laboratory than ever before; that is, sales of fertilizers, feedstuffs and lime are made with the understanding that our reports will be used as a basis of settlement.

Phosphate rock is being used as a source of phosphoric acid more extensively than for any previous year. The other fertilizing materials are holding their same place in proportionate sales. There were more Paris green shipments than for any of the past five years.

Mr. A. P. Kerr has performed some chemical work in connection with the investigations of cotton seed meal poisoning by the departments of plant and animal pathology. The publications of the laboratory, namely, the Fertilizer and Feedstuffs Bulletins are receiving the usual demand among the trade.

EXHIBITS AT THE STATE FAIR.

The Experiment Stations again made an exhibit of their work at the State Fair at Shreveport. While the previous exhibits have laid stress on field experiments, the exhibits of this year laid stress on the scientific work, particularly on the work being done by those engaged in research work, setting forth the work being carried on in sugar, rice and diseases of plants and animals. It is believed that these exhibits do a great deal of good in attracting attention to what the station is doing to further knowledge of agriculture.

SPECIAL AGRICULTURAL TRAIN.

The Experiment Stations furnished a very large portion of the exhibits for the Demonstration Train that operated over practically all of the railroads of the state from March 4th to May 13th, 1912. The train made more than two hundred stops throughout the state, and we had a total attendance at the lectures and demonstrations of something like 145,000. The attendance would have been considerably larger if it had not been for the excitement incident to the high water that prevailed during the latter portion of the tour. The train carried exhibits of beef cattle, dairy cattle, different breeds of hogs, poultry, farm implements and machinery and general agricultural exhibits. We see many evidences of the good that has been accomplished by the operation of this train. The State Board of Health extended us free of charge the use of their sleeping car, which greatly reduced the expense of operating the train. The Farm Demonstration Agents of the Farmers' Co-operative Demonstration Work of the United States Department of Agriculture. assisted us in nearly every portion of the state. The State Superintendent of Education installed a very instructive school exhibit in a portion of one of the cars and accompanied the train a considerable portion of the time, and at other times had a representative from his office to assist in the lectures and explanations of the exhibits.

All of the railroads took a very active interest in the work and did everything possible to make the tour a success.

FARMERS' SHORT COURSES.

The members of the station staff took a prominent part in the lectures and demonstrations given at the Short Course at the University in January, and the Short Course given at Bellevue, in Vernon Parish. They have also taken a prominent part in farmers' meetings throughout the state during the entire year.

Station No. 3, North Louisiana Experiment Station

Calhoun

Mr. S. E. McClendon was in charge of this station throughout the year. His resignation was submitted to take effect December 31st, and Mr. J. B. Garrett, Assistant Director at Baton Rouge, has been transferred to the Calhoun Station for the year 1913.

Most of the experimental work was a continuation of work previously outlined.

We have spent considerable money in improvements during the year. The new residence for the Assistant Director was completed about the first of February, but we have found the extra expense of renewing fences, putting in plumbing, completing the painting, etc., has added quite materially to the cost. During the year we have almost completely renewed the fences around the farm, making between four and five miles of new fence, most of it hog-tight. This was ncessary partly from the bad condition of the old fences and partly to reset the fences to the lines of the new survey and to include twenty acres of land purchased on the north side of the station grounds and forty acres purchased on the east side and twenty acres on the southeast corner. These purchases have previously been reported, but we did not gain possession of them until the present year.

Some money was also spent in providing accommodations for the crowds attending the annual fair.

Mr. E. J. Watson resigned to go into private work, but afterwards decided to remain with the station, so he has been reassigned as horticulturist, and there was an interruption of only a short period in his work.

The grape crop on the station this year was very good indeed, confirming results previously secured, and seems to indicate that the hill land there may be well suited for grape culture. Some of the varieties have poor shipping qualities, but in a small way we tested them out for making grape juice and find that they make a good quantity and an excellent quality, and I believe there is a possible future for the grape juice industry on the hill lands in that portion of the state.

Several hundred of the seedling peach trees bore this year. Most of them, however, were poor quality and will have to be discarded. The work is encouraging, however, in that several of the seedlings are worthy of propagation and may become quite valuable. It will take a number of years to demonstrate their worth.

The hog experiments have given very satisfactory results this year on all of the crops grazed. The results of these experiments will be published at an early date in bulletin form, giving specific data regarding crops and the gains made on each.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

This organization has continued to hold its meetings at the Experiment Station grounds throughout the year, the principal meeting being the annual camp meeting and fair. It is generally considered that the fair of September, 1912, was the best that we have ever had. The season was favorable for the production of miscellaneous crops in that portion of the state, so that execllent material was available, and marked improvement was noticeable in the artistic manner in which nearly all of the displays were arranged.

The premiums for this fair are secured by subscription from the citizens of Ouachita and adjoining parishes and from some of the fertilizer and implement dealers who do business in that territory. The Police Jury also gave an appropriation, as usual, and have heartily supported the work.

Station No. 4, Rice Experiment Station

Crowley

The following is the report of Mr. F. C. Quereau, Assistant Director, who has had charge of the work for the past year:

All of the experiments outlined in the report of 1910 have been continued. The results of three years' experiments have been tabulated and are believed to be of enough importance to be published in bulletin form. During the past two years the station has had considerable correspondence with people of the North who are interested in Louisiana lands and rice culture. There is a growing demand by the rice farmers for information regarding rice fertilizers, rotation of crops, and the eradication of red rice and other weeds. In order to meet this demand for information properly, a bulletin is necessary. We propose to publish a co-operative bulletin with the U. S. Department of Agriculture early in the present year.

COMMERCIAL FERTILIZERS.

We have twenty-seven ffifferent plots devoted to the testing of commercial fertilizers. The amounts used vary in price from $1.25 per acre to $12.75 per acre. The three principal elements of plant food, phosphorus, potash and nitrogen, are used alone in different quantities, also in various combinations. We propose to continue these experiments without variation for ten or fifteen years, and by this means gather data which will enable us to answer any question that the rice farmer may ask with reference to any combination of commercial fertilizers or the elements when used alone, also the effect of their continuous use upon the soil without rotation of crops. There are numerous checks on these experiments, among which is the use of stable manure with and without commercial fertilizer. Eight plots are devoted to a test of raw rock posphate as a source of phosphorous against 16% acid phosphate and Thomas slag meal. The rotation employed in this experiment is rice, corn, and cowpeas.

ROTATION EXPERIMENTS.

We are directing every effort toward the discovery of a profitable crop rotation for rice. The only rotation practiced in this section is pasturing the land while it is "resting," or allowing it to return to sod. This is not profitable, and is of little value in eradicating red rice or weeds. We have one three-year rotation, which is rice followed by corn and cowpeas with a winter cover crop of oats, followed by cowpeas alone, fallowed during the winter, and planted to rice next spring. Rice is grown on the land once in three years. There are two two-year rotations—corn and cowpeas followed by rice. On one of these rotations a winter cover crop is grown, and on the other rotation the land is fallowed during the winter. All possible vegetable matter is turned under. We have one four-year rotation consisting of rice two years and grass or lespedeza two years.

IRRIGATION EXPERIMENTS.

Three plots are devoted to irrigation experiments with the object of determining the proper amount of water for profitable irrigation. The rotation highland crops are irrigated when it is necessary.

MISCELLANEOUS CROPS.

We have several plots on which we plant any seed which may be desirable as rotation crops on rice land. Sugar cane, soy beans, sorghum, broom corn and sweet potatoes seem to have considerable promise as rotation crops.

CO-OPERATION.

Mr. J. M. Jenkins of the Bureau of Plant Industry of the U. S. Department of Agriculture, has continued the work of rice breeding. He has greatly extended the work in the seed nursery during the past year. A number of new head selections have been made, the selection of promising hybrids has been continued, and some new foreign varieties have been propagated. It may be said with reference to the work of Mr. Jenkins that the red rice with which the land was badly infested prevented any effective work in seed breeding prior to 1911.

Mr. J. L. Webb of the Bureau of Entomology, U. S. Department of Agriculture, carried on during the summer, investigations of the life history of the rice root weevil and other insects. He has made marked progress in this work, which, when completed, will be of great value to the industry.

IMPROVEMENTS.

During the past year we have erected a shop 20′x28′, having concrete floor and foundation. A part of this building is used for blacksmith and carpenter shop and a part for the engine and force pump of the water system. The water is pumped into a tank elevated on a 30-foot steel tower. A system of pipes connect the tank with the buildings and grounds, which insures ample water supply for the plantings and for fire protection. A residence which will cost $3,200 is being constructed for the use of the Assistant Director.

The revenues from sale of farm products, seed, etc., for the year amount to $944.71.

NEEDS OF THE STATION.

The station is in need of funds to construct a small rice mill for testing out the character of grain to make our experiments complete. In the study of the influences of fertilizers on rice, the problem is only half solved when we learn the influence of the different elements on the quantity production of grain. There is a large variation in the amount of milled rice secured from a barrel of rough rice, and we have been unable up to the present time to tell how the milling quality is influenced by fertilizers, methods of irrigation and manner of handling the grain. The average rice mill requires a large quantity of rice to make a test for milling quality, but we can have constructed a special mill that will give reliable data, using only a sack of rice or so for each test. Such milling equipment would cost approximately $3,500 to $4,000. It ought to be provided at the earliest possible date. The station should also purchase four acres of land which adjoins it on the east. This land is required for pasture purposes. A soft plug sprinkling system should be installed in the laboratory and in the barn. This would prevent loss by fire and the reduced insurance would soon pay for the installment. Unless protected by a system of this kind the insurance on a laboratory risk is excessive. The insurance premium on the laboratory alone is $90.00 a year. We should be provided with a small pump and engine for drainage experiments. A gas machine is necessary to furnish lights for the station buildings. All buildings are provided with gas pipes.

Changes in Experiment Station Staff.

Mr. S. E. McClendon resigned as Assistant Director, Calhoun Station, January 1, 1913, and was succeeded by Mr. J. B. Garrett.

Mr. F. S. Craig resigned as Secretary to the Director July 1, 1912, and was succeeded by Mrs. Edith Strong.

Mr. R. G. Fuller resigned as Assistant Chemist October 1st, 1912.

Mr. Rene Baus resigned as Assistant Chemist November 15th, 1912, and was succeeded by Mr. I. Selecter.

Mr. W. McClendon resigned as Farm Manager, Baton Rouge Station on December 1st, 1912, and was succeeded by Mr. A. J. Parent.

Mr. S. G. Chiequelin resigned as Assistant Director of Audubon Park Experiment Station on November 1st, 1912, and was succeeded by Mr. W. G. Taggart.

Mr. Victor Jorda resigned as Farm Manager at Audubon Park Experiment Station.

Mr. J. E. Bryan resigned as Farm Manager at the Calhoun Station on November 1st, 1912.

Needs of the Stations.

The work of the Experiment Stations has grown more rapidly during the past few years than the funds have increased for taking care of it.

The Calhoun Station particularly needs better facilities for taking care of both live stock and agricultural exhibits at the annual fair that is held on the station grounds. Also, we are in need of more scientific assistance for carrying on the work of that station. An addition of $2,500.00 per year for operating expenses would enable us to put on another man to further the scientific work for which there is urgent need.

The Sugar Station is in need of additional equipment in the sugar house, and for machinery that would enable us to carry out experiments that we are now unable to give attention to. Sugar house machinery is quite expensive, and the money that we have had available has not allowed us to keep pace with developments in a way that would make our work most efficient in aiding in the improvement of sugar-house methods. Also, we need additional scientific assistance in carrying on the work there. There is a demand for more work than we can give attention to with the present funds.

The State Station at Baton Rouge is in need both of considerable additional equipment and of assistance in the clerical and scientific force. We are also greatly in need of additional funds for the issuance of publications. Our bulletins are quickly exhausted, and with the present funds we are unable to have reprints made. The growing demand for information regarding the results of experimental work has increased so greatly that the expense of issuing publications has become quite heavy. We have need for quite a number of bulletins that we are unable to issue on account of lack of funds. We ought to have at least $5,000.00 a year in addition to what we now have for printing and for clerical help. During the past year an average of about one thousand personal letters per month were written, and the time of the Director and the available clerical force is so completely taken up with correspondence that they are unable to give the proper attention to study of experimental work, proper filing of reports and compilations for publication.

We also need some new buildings on the Experiment Station farm. We have only one building that was especially constructed for the use to which it is now devoted. The barns and sheds were on the grounds before it was used for experimental work and are by no means representative of what people expect to find on the Experiment Station grounds. No progressive farmer would want to construct the kind of cowsheds or horse-barns that we are using.

Also, we ought to have some specific sum available for demonstration trains, for the preparation of exhibits for advertising purposes and for miscellaneous expenses not provided for under the present plan of operation.

Financial Statement.

RECEIPTS AND DISBURSEMENTS OF ALL FUNDS.

HATCH AND ADAMS FUNDS.

Dr.	Hatch Fund	Adams Fund
To receipts from the Treasurer of the United tates as per appropriations for fiscal year ending June 30, 1912, under Act of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By Salaries	$ 9,249.85	$12,188.84
Labor	3,610.30	564.56
Publications	581.25	
Postage and Stationery	37.10	36.63
Freight and Express	1.70	102.44
Heat, Lights, Water and Power		302.09
Chemical Supplies		203.94
Seeds and Sundries	148.38	97.57
Fertilizer	75.75	
Feeding Stuffs	696.20	135.47
Library		110.85
Tools, Implements, and Machinery		197.99
Furniture and Fixtures		67.54
Scientific Apparatus	90.40	545.75
Live Stock		89.70
Traveling Expenses	4.07	329.14
Contingent Expenses	25.00	
Building Expenses and Repairs	480.00	27.49
Total	$15,000.00	$15,000.00

STATE FUND.

Received from the State Treasurer	$21,416.60	
Miscellaneous Sales	4,014.48	
Payment of Accounts Fertilizer and Feed Stuff	3,000.00	
Fidelity Phenix Fire Ins. Co	281.35	
Detroit Fire and Marine Ins. Co	281.35	
Peoples National Fire Ins. Co	237.28	
Deficit Nov. 30, 1912	9,514.90	
Total		$38,745.96

Disbursements—	Hatch Fund	Adams Fund
Salaries	$ 9,428.52	
Labor	4,530.86	
Publications	601.48	
Postage and Stationery	338.35	
Freight and Express	521.12	
Heat, Water and Light	137.43	
Seeds and Sundries	2,526.05	
Fertilizer	760.55	
Feed Stuffs	1,709.64	
Library	119.93	
Tools, Implements and Machinery	1,285.99	
Furniture and Fixtures	134.00	
Live Stock	1,176.25	
Scientific Apparatus	4.75	
Traveling Expenses	1,017.40	
Contingent Expenses	1,259.73	
Building and Repairs	6,375.78	
Demonstration Train	4,040.30	
Deficit Nov. 30, 1911	2,777.83	
Total		$38,745.96

FERTILIZER AND FEED STUFF FUND.

Received from the Commissioner of Agriculture	$21,000.00	
Miscellaneous Sales	25.90	
Total		$21,025.90
Disbursements—		
Salaries	$ 8,644.45	
Labor	524.65	
Publications	854.62	
Postage and Stationery	440.27	
Freight and Express	64.01	
Heat, Water and Light	471.03	
Chemical Supplies	763.88	
Seeds and Sundries	347.28	
Feed Stuffs	4.80	
Library	10.59	
Traveling Expenses	1.05	
Contingent Expenses	18.42	
Building and Repairs	256.59	
Expenses of Experiment Station Accounts	3,000.00	
Deficit Nov. 30, 1911	2,301.88	
Cash on Hand	3,322.38	
Total		$21,025.90

AUDUBON SUGAR EXPERIMENT STATION REPAIR FUND.

Receipts—		
Received from the State Treasurer		$ 3,000.00
Disbursement—		
Building and Repairs	$ 1,588.79	
Cash on Hand	1,411.21	
Total		3,000.00

These accounts have been examined and approved by the State Supervisor of Public Accounts. They have been sworn to by me in prescribed form, and I have here given a true and correct copy of reports made to the State Supervisor of Public Accounts.

Respectfully,
W. R. Dodson,
Director.

Publications Issued During 1912

Twenty-fourth Annual Report.
Bulletin 134, Some Studies on Cotton-Seed Meal Poisoning.
Bulletin 135, Investigations on Methods of Analysis of Cane Products.
Bulletin 136, Carrion Feeders as Disseminators of Anthrax or Charbon.
Bulletin 137, The Rots of the Cotton Boll.
Bulletin 138, An Experimental Study of Heat Transmission and Entrainment in a Vacuum Evaporator.
Bulletin 139, The Bean Blight and Preservation and Treatment of Bean Seed.
Report of Analyses of Commercial Fertilizers and Paris Green Season 1911-1912.
Report of Analyses of Commercial Feed Stuffs for Season 1911-1912.
Press Circular, Treatment for Worms Injuring Corn.

Every member of the Station Staff who is at the head of a department has written more or less for the agricultural press, giving in a popular way the results of experiments or giving summaries of important information of current interest pertaining to Louisiana crops.

TWENTY-SIXTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

---

FOR 1913

TO THE GOVERNOR

By W. R. DODSON, Director

BATON ROUGE
Ramires-Jones Printing Co.
1914

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR LUTHER E. HALL, *President.*
T. JONES CROSS, *Vice President, Board of Supervisors.*
E. O. BRUNER, *Commissioner of Agriculture and Immigration.*
THOS. D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS:

HENRY GERAC, Lafayette;
JOHN J. HENDERSON, Lagan;
J. E. BULLARD, Belmont.
JOHN T. COLE, Monroe;
R. E. THOMPSON, Wilson;

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
A. P. KERR, M. S., Assistant Director, Baton Rouge.
J. B. GARRETT, B. S., Assistant Director, and Entomologist, Calhoun.
F. C. QUEREAU, M. S., Assistant Director, Crowley.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
HARRY MORRIS, D. V. M., Bacteriologist and Assisatnt Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
E. W. KERR, M. E., Professor Mechanical Engineering, Baton Rouge.
E. S. TUCKER, Associate Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
W. E. CROSS, Ph. D., Chemist, Audubon Park, New Orleans.
WM. L. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
J. K. McHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
G. D. CAIN, B. S., Chemist in Charge of Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
J. M. JENNINGS, B. S., Assistant Chemist, Baton Rouge.
S. BYALL, B. S., Assistant Chemist, Baton Rouge.
I. SELECTER, B. S., Assistant Chemist, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
I. LEVIN, B. S. A., Assistant Chemist, Baton Rouge.
R. L. BOWMAN, B. S., Assistant Chemist, Baton Rouge.
MRS. EDITH STRONG, Secretary to the Director, Baton Rouge.
E. J. WATSON, Horticulturist, Calhoun.
C. H. STAPLES, B. S., in Charge of Dairy Dept., co-operating with Dairy Div., Bureau ofAnimal Industry, Baton Rouge.
MISS CORA JACOBS, M. A., Scientific Assistant in Charge of Seed Laboratory, detailed by U. S. Dept. of Agriculture, Baton Rouge.
ROGER P. SWIRE, B. A., Treasurer, Baton Rouge.
F. V. EMERSON, Ph. D., in Charge Soil Survey Work, Baton Rouge.
C. W. DAVIS, Mailing Secretary, Baton Rouge.
A. J. PARENT, Farm Manager, Baton Rouge.
C. J. BARRILLEAUX, Farm Manager, Audubon Park, New Orleans.

Louisiana State University and
Agricultural and Mechanical College.
Office of Experiment Stations.

Baton Rouge, La., January 15, 1914.

To His Excellency, Luther E. Hall,
Governor of Louisiana:

Sir—In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 2, 1906, known as the Adams Act, providing for Federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1913, and a financial statement for the government fiscal year, July 1, 1912, to July 1, 1913.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of Federal funds, so as to show the total receipts and expenditures for twelve months. The accounts have been examined and approved quarterly by the Supervisor of Public Accounts.

The work of the Experiment Stations may be classified under four general heads. *First,* scientific investigation; *second,* dissemination of information gained through experimentation; *third,* administrative affairs; *fourth,* participation in regulatory service.

1. *The scientific investigations* range from the higher form of pure research for advancing our knowledge of fundamental principles to the simpler forms of experimentation and test work, such as crop rotation experiments, crop variety tests, introduction of new plants, etc. The appended reports show that this work has progressed satisfactorily in all lines. There has been no change during the year in the staff of men engaged in experimental work. The efficiency of their efforts is partly due to continuity of service. Several members of the staff have been offered positions elsewhere, generally with increased salary, but

these offers have been uniformly declined, mainly for the reason that our men are greatly interested in the development of their investigations and do not wish to leave incompleted work which is yielding results that will add to their scientific reputation for a new field that may not be as fertile in opportunities.

2. *The dissemination of information* is accomplished through the publication of bulletins, special articles in the agricultural papers and scientific journals, correspondence, addresses and discussions at agricultural meetings, exhibits at agricultural fairs, and by personal explanations to visitors to the laboratories and experiment station farms. The participation of the heads of departments in this line of activity is referred to in the several appended reports.

3. *The administrative work* embraces the supervision of the expenditures of the various departments, approval of projects for investigation, making proper reports to State and Federal Governments of the expenditure of funds and of the progress of the work; the publication and distribution of bulletins and attention to the general correspondence of the station. This work falls mainly upon the director and assistant directors. The direct supervision of the farms also falls upon the assistant directors.

All required reports to the U. S. Department of Agriculture have been made. All have been approved by the proper authorities of the Federal Government. Annually the Office of Experiment Stations sends an inspector to examine the vouchers and account books of the Federal funds and to discuss with the several members of the staff the work being done in the laboratories and in the field. The Comptroller of Currency would withhold the Federal funds of subsequent appropriations unless the accounts and vouchers were satisfactory, or unless the work had made reasonably good progress. Our lines of work and the expenditure therefor have been promptly approved. The State Supervisor of Public Accounts examines quarterly the accounts of all money received and disbursed by the Experiment Stations. Our accounts have been regularly approved by him.

We have sent out during the year from the Baton Rouge office 54,864 bulletins, 2,931 postal cards, 17,409 form letters and 10,091 personal letters, most of them written in response to inquiries of agricultural problems. The total number of personal letters written at the four stations during the year was 12,578.

AGRICULTURAL TRAINS.

The Director and members of the station staff have participated in the work of three agricultural trains. The Texas & Pacific Railway with our cooperation operated a train over their line from New Roads south to White Castle, then north to the extreme northern portion of the state. The Experiment Stations furnished the cattle, general agricultural exhibits and the machinery for demonstration purposes on their line.

The Cotton Belt operated a train on their line consisting of equipment furnished by the railroad. We participated in the lectures and demonstrations.

The Corn Special was run from Monroe to Ruston over the V. S. & P., thence to Alexandria over the Rock Island, thence to New Orleans over the L. R. & N., under the auspices of the Monroe Chamber of Commerce. Some of the station staff lectured at each stop made by the train.

All the railroads have shown marked interest in the work of the stations. The railroads have co-operated with us in every enterprise and with one exception on the part of one of the roads, everything that we have requested has been granted by the railroad authorities.

AGRICULTURAL FAIRS.

As indicated by the reports from the different departments, the station has furnished one or more judges for nearly every Parish Fair and for the State Fair at Shreveport.

The Experiment Stations had an exhibit at the State Fair illustrating some of the more important phases of the work being carried on by the several departments.

AGRICULTURAL FIELD DAYS.

The annual field day was held at Crowley on August 22. Every one pronounced the meeting a great success. A larger number of farmers than ever before went over all the plots of the field and heard the explanations given of the experiments that are being conducted.

Field day at the Sugar Experiment Station at Audubon Park was held on June 12. The attendance was large and the meeting was a success from every viewpoint. The most interesting exhibition given was that of traction plows.

SHORT COURSES IN AGRICULTURE.

The Director participated in giving short courses in agriculture during the year at Merryville, Leesville, Marion, Marksville. Dubach and Minden.

In the early part of August the Director was called to Washington by Secretary Houston for the purpose of discussing agricultural conditions in Louisiana with particular reference to the readjustment of the agriculture of South Louisiana to the conditions that would arise under the new tariff bill.

In October, Mr. W. A. Taylor, Chief of the Bureau of Plant Industry, and Mr. B. H. Rawl, Chief of the Dairy Division of the Bureau of Animal Industry, came to Louisiana as the personal representatives of the Secretary of Agriculture, to study the agricultural conditions of the state. They were accompanied by Senator Jos. E. Ransdell and Senator-elect Robt. F. Broussard, and the Director of the Stations, at the request of the Secretary of Agriculture and the Senators, accompanied the party through the state.

On the report of Mr. Taylor and Mr. Rawl, the Secretary has requested in his estimate to Congress that they appropriate $50,000 for carrying on experimental and demonstration work along the lines of live stock production in Louisiana. If this appropriation is secured the plan will be to establish a demonstration farm of not less than four or five hundred acres, where demonstration work in live stock production and feeding may be conducted on a sufficiently large scale to involve all of the ordinary commercial problems to be dealt with in an enterprise of this kind.

Eight formal addresses were given by the Director to scientific and literary societies and high school commencements and numerous articles have been written for the agricultural press, particularly for the Progressive Farmer, Farm and Ranch, Gulf States Farmer, Item Farmer, Country Review, Shreveport Times. The ''Question Box'' has also been prepared each week for publishing answers to questions sent to the Country Review.

A considerable portion of the time of the Director is consumed by prospective purchasers of land from outside the state. These parties want first-hand information from disinterested individuals who have had practical experience in crop production and in the handling of live stock, and who are conversant with climatic conditions and know the soil types throughout the state. Most of the men seeking such information look to the Experiment Stations as the most reliable source from which to secure it. There is scarcely a day during the fall and winter that we do not have one or more visitors who wish to take from a half hour to two hours of the Director's time for discussing agricultural problems and the possibilities of crop and live stock production. Correspondence directed to the station on these topics during the winter period will total probably twenty-five to thirty per cent of the total correspondence. The stations answer from 2500 to 3000 letters per year coming from out-of-state parties who are seeking information regarding Louisiana.

During the year the Director has, in addition to his other duties, looked after a considerable portion of the work ordinarily cared for by the Assistant Director at the station. The work, however, has become so heavy that it will be necessary to reestablish the position of Assistant Director to take care of the farm work at Baton Rouge.

4. The work that may be classed as pertaining to *regulatory affairs* is that of inspecting nursery stock for the prevention of the introduction or distribution of destructive insects, and participating in the work of fertilizer and feed stuff control. The report of Mr. E. S. Tucker shows what has been done in the line of inspection of nurseries and of imported plants. More adequate provision should be made for taking care of this work. The Experiment Stations should either be relieved of looking

after the technical part of this service or be given full control of it. It would be to the welfare of the stations to have no part in it.

The fertilizer and feed stuff control work has its business year extend from September 1 to August 31. Report of the laboratory work for the season 1912-13 has recently been published. The year for the feed stuff control work ends August 31. Report of the laboratory work in this line has been in the hands of the printer about two months, and we hope may be printed at an early date.

The fertilizer and feed stuffs control work should be reorganized if the best results are to be secured.

Legislative enactments from time to time have so entangled the duties of those engaged in the agricultural activities of the state that some of the old laws should be repealed and new laws enacted that will clearly set forth the fields of activity in which the state is to engage in promoting agricultural development, and more clearly define the responsibilities of those who may be elected or employed to do the work, as well as the authority of the boards to whom responsibilities are entrusted. As an illustration of this entanglement, I cite you to the fact that the Board of Supervisors of the Louisiana State University elects the professor of agriculture at the State University, who, ex-officio, becomes Director of the Experiment Stations. The work of the stations is under the supervision of the State Board of Agriculture and Immigration. We thus have one board electing a man to have charge of work over which they have no control, and another board having control of work without authority to employ or discharge men to do the work. Again, agricultural instruction has developed since the enactment of the legislation referred to, until the title of professor of agriculture is retained only to comply with the law, and is not recognized in fact.

Again, there is division of authority in the inspection and analysis of fertilizers and feed stuffs that is detrimental to the best service. In the third paragraph of this report attempt is made to classify the kinds of agricultural work that may be done by the state. Those engaged in these activities will have their duties and opportunities overlap to some extent, but in the main they may be segregated.

Scientific investigation is pre-eminently the first function of the Experiment Stations. For the best results, those engaged in this work should be relieved very largely of other responsibilities.

The dissemination of useful information on agricultural topics is teaching. This is pre-eminently the function of the Agricultural College. The most efficient man in this service should not be overburdened with other responsibilities.

The administration of regulatory affairs does not necessarily overlap the work of either research or teaching. There are but two reasons that I know of from the farmer's viewpoint why the work of fertilizer and feed stuff inspection should in any way be participated in by the Experiment Stations, since we have passed through the pioneer stages of investigation along these lines. One reason that has been advanced for such participation is that the analytical work is scientifically technical, and only technically trained men should be employed to do the work; and that such men being out of the realm of politics would not be employed by political officers. The other reason is that the stations have received pecuniary aid in carrying on their work by the net revenue remaining after paying the expenses of the inspection and analytical service.

It would seem that the Legislature could provide for keeping the service free of politics, if they so desired. It would be more satisfactory to the Experiment Station workers to have by direct appropriation the amount of money that is to be spent on their work than to have a fluctuating and uncertain income from indirect sources.

The only reason that I know of from the viewpoint of others for continuing the service as it is now conducted is that it affords a goodly number of positions to which politicians may be appointed, in the inspection service, and the salary and traveling expense accounts constitute a valuable asset to a political organization.

The State Board of Agriculture and Immigration is designated by the Constitution of Louisiana, Article No. 306, as the proper organization to have control of the execution of the laws pertaining to fertilizers. The acts of the Legislature have divested the board of any direct participation in the administration of such laws. The Commissioner of Agriculture and Immigration has supervsion of the inspection and the Experiment Stations the analysis of fertilizers, Paris green and feed stuffs.

The State Board of Agriculture is no longer an active organization, the last meeting having been held nearly six years ago. Whether this is because they have been legislated out of a function I am unable to say.

The Legislature of 1912 was requested by you to pass an act revising the laws governing the inspection of fertilizers and feed stuffs, placing the work under the supervision of the State Board of Agriculture and Immigration, as provided in the constitution.

At your request, I gave assistance in framing a bill after the suggestions of the Association of Fertilizer and Feed Stuffs Control Officials of the Southern States. This bill was passed by the House, but failed to reach the Senate in time to have a vote in the regular course of the calendar. Two-thirds vote to suspend the rules for the consideration of the bill was not obtained and the measure was lost. The existence of the present situation is not due to the efforts of any one individual. It has been cumulative for many years. During the administration of Col. Charles Schuler, the matter of revising the inspection service was fully discussed. He was personally in favor of a revision, but found so much political opposition to taking up the matter that his efforts in that direction were abandoned.

On page 710-711 of the Official Journal of the House of Representatives, of the session of 1910, you will find a report of a special committee appointed to look into this question. I am taking the liberty of copying the report in full. I know nothing of the immediate reason for the appointment of the committee. I feel very sure that the criticism referred to was not a reflection on Col. Schuler, but a criticism of a system that had grown up under successive administrations.

"House of Representatives,
State of Louisiana,
Baton Rouge, La.,
June 27, 1910.

To the Honorable the Speaker, and Members of the House of Representatives of the State of Louisiana:

Gentlemen:

I am directed by your Committee on Appropriations to submit the following report of the sub-committee appointed by the Committee on Appropriations to investigate the charges relative to the management and conduct of the Affairs of the Commission of Agriculture, Immigration and Commerce:

June 27, 1910.

REPORT APPROPRIATION COMMITTEE.

To the Chairman and Members of the
Committee on Appropriations:

Gentlemen:

We, your sub-committee appointed to investigate the Department of Agriculture as to receipts and disbursements, and especially as to the funds growing out of commercial feed stuffs, fertilizer, Paris green, and as to the collection of the same, respectfully submit the following report:

Our report is based upon the information given by officials and employees of the Department with the assistance of the Department of the Traveling Auditor.

Our investigations convinced us that all moneys received have been credited as per the report of the Traveling Auditor, to the proper accounts, and there appears no shortage either in the office of the Department of Agriculture or in that of the Director of the Experimental Station. Our investigations, however, further convinced us that the expense of conducting the inspection branch of the Agricultural Department, with reference to the collection of commercial feed stuffs and fertilizer for subsequent analysis, are so large as to amount almost, in our opinion, to extravagance, as will appear by the following figures:

From January 1, 1909, to March 31, 1910, inclusive, there were collected by the sale of tags the following amounts:

Commercial Feed Stuffs	$60,224.29
Commercial Fertilizer	36,259.32
Paris green	1,245.82
Making a total of	$97,729.43

The cost of inspection and the conduct of this Department, which is paid out of this fund, amounted to $49,767.86, which may be apportioned as follows:

Expenses in general office	$ 4,125.00
Expenses in four branch offices	2,450.48
Expenses in Chief Inspector's office	3,837.58
Salaries of inspectors and traveling expenses in the field	39,354.80

There are other miscellaneous items paid out of this fund, which would make the figures exceed those herein set forth, but they are not given as we have been unable to classify the items.

The Experimental Station laboratory handling these samples shows an expenditure of $19,067.89 for the same period.

The above figures speak for themselves, and your committee believes that a more economical system can be organized.

Your committee believes that the Department of Fertilizer and Feed Inspection should be transferred to the Experiment Department, and all field inspection as well as laboratory analysis be conducted by that department. The value of this suggestion may be indicated by a reference to the present method and a reasonable conjuncture of the result of a change. As presently conducted, the inspectors in the field gather the samples of feeds and fertilizers and subject the same to no examination as to their constituents, but send the samples to the Chief Inspector's office in Baton Rouge, who, in turn, transmits the same to the Experimental Station, where they are analyzed, the result of such analyses being transmitted back again to the office of the Inspector, thence to the shipper or buyer. The cost of gathering the samples is shown in the figures herein submitted to be about $2.25 per sample, and the cost of analysis by graduate chemists is about 81 1-2 cents per sample.

Should the transfer as recommended be made, your committee believes, after a careful consideration of all presentations for and against, that the chemical or analytical sections should be organized so as to include the field inspection, and the chemists alternate field with laboratory work. Good and sufficient reasons for this change are—first, that a physical examination by a chemist is of great value for immediate action concerning a shipment of inspected stuff, and, secondly, a better selection of samples for inspection and analysis may be made. Again, the delay caused by the transmission of samples through another department works a hardship often to shipper and consumer alike.

Your committee further believes that the organization as outlined here could be handled by fifteen men, including field and laboratory, instead of as presently organized, twenty-five men, sixteen of whom are inspectors and eight are chemists. Our investigations show that the salary of the technical man, the chemist, is lower than that of the field inspector. It now appears that the field men collect twice as many samples as the chemical department are able to analyze, and at present, with the exception of tankage, few analyses are made of specific samples, but samples purporting to be the same grade are often combined for one analysis.

The itinerary of these field inspectors should, in our judgment, be changed frequently, in order to acquaint the inspectors with new conditions and new situations and enable the department to keep a better check on the work of the inspectors in the field.

Your committee further believes that the analytical and inspection work can be conducted, if organized in accordance with the recommendations herein, at a cost not to exceed the present cost of the field work alone, thereby saving several thousand dollars for other needed agricultural work.

At the request of the committee, Mr. Dupuy, Chief Inspector, furnished a list of the cases in which legal proceedings were instituted against violators of the fertilizer law, this being but six cases for failure to attach tags, all these cases were dismissed upon defendant paying cost of court and purchasing tags. We have no evidence of the department's having taken proceedings against manufacturers offering for sale grade of fertilizer inferior to the guarantee, yet the State Chemist's report shows that during the years 1908 and 1909 in the one item of cotton seed meal, 44.39 per cent of the meals inspected fell below the guarantee in nitrogen, and of 2523 samples of fertilizers, 1053 fell below the guarantee in one or more elements. No case of prosecution to penalty for violation of the law is shown.

The committee has in its possession detailed statements, as far as possible it has been able to secure them, and they may be examined at any time.

We respectfully recommend that the Committee on Appropriations suggest to the Governor that, should an extraordinary session of the General Assembly be called, that one of the purposes embrace the subject matter in this report.

Your committee expresses its thanks for the able aid rendered in compilation of accounts by Mr. Sandoz, of the Public Accountant's Department.

Respectfully submitted,
J. S. Atkinson,
Isaac D. Wall,
Leon Locke,
Jos. E. Generelly,
Sub-committee."

I do not agree with the report of the committee in that the inspection service should be transferred to the Experiment Stations, but I do feel that the service would be much more efficient if scientifically trained men were in charge of the sampling of fertilizers and feed stuffs. There would be great advantage in employing scientifically trained men for this service in that they could give the people reliable information regarding fertilizers and feed stuffs while they are traveling over the State to secure the samples, and during the period when the work is least exacting of their time they could render a valuable service to the State in supervising fertilizer tests, and the study of soil types and in aiding in securing knowledge of the distribution of soil types throughout the State and the correlation of accumulated data regarding soils and fertilizers.

My personal judgment is that it would be better for the experimental work of the stations if they had no direct responsibility for any part of the fertilizer and feed stuff control service. Should the matter be put into the hands of the Board of Agriculture, I would respectfully suggest that adequate provision be made for centralizing the responsibility for the entire work under one head.

STATE STATION, BATON ROUGE.

Experiment Station Farm.

The field work during the past year has been very largely a continuation of experiments outlined in previous reports. It is necessary to continue these experiments over a long period to secure the most reliable data from them. These experiments cover tests in the spacing of corn, different methods of cultivating corn, times of applying fertilizer, removal and non-removal of suckers, seed selection, ear to row tests, rotation experiments, variety tests, etc. Experiments with forage crops embrace a comparative study of the most promising crops that can be used for soiling, silage crops and for hay, such as sorghums, clovers, grasses, soy beans, cow peas, velvet beans of different strains, kudzu, etc.

The dasheen, a new substitute for the Irish potato, was grown on the station this year for the first time.

About one acre has been devoted to small plantings of new plants secured through the Division of Seed and Plant Introduction of the United States Department of Agriculture.

An experiment in determining the relative availability of phosphorus in slag meal, as compared to other forms of phosphorus has been conducted in co-operation with five other experiment stations.

The field experiments in grazing hogs have been continued with satisfactory results.

A series of experiments was planned in co-operation with the Department of Agronomy of the University to make a study of the soil moisture in plots given different preparation and different culture, planted in corn. These plots were on the ground recently acquired by the Experiment Stations and conditions developed that indicated that results would not be satisfactory and the experiments were discontinued, in June. We have planned, however, to renew the effort to secure data along these lines.

Additional land available to the station this year has enabled us to take up several new lines of experimental work. The land on which these experiments are to be conducted was poorly drained, had not been cultivated for a good many years and was badly infested with grasses and weeds. During the year 1913 it has been devoted to crops to put it in good tilth for experimental work for 1914. Part of the land is suited only for pasturage and will enable us to enlarge our work in live stock production.

During the year, Harry Bros., of New Orleans, erected for experimental work a galvanized iron silo on the station farm, which was filled with corn and sorghum silage to be fed during the winter of 1913-14. If the silo is not satisfactory in every respect, the station will not be at any expense for the construction; if it is found to be satisfactory, the station will pay the factory cost of the material and the freight.

Two acres were devoted to ramie with the view of testing out a decorticating machine that was thought to be an improvement over machines previously tried. Mr. Lyster H. Dewey, in charge of fiber investigations of the United States Department of Agriculture, came to Baton Rouge to conduct the harvesting experiments. The ramie crop was good, but the machine was not found to meet all of the requirements. We have not yet despaired, however, of finding a machine that will successfully decorticate ramie, and the crop will be grown for further trials of modified machinery.

Some new experiments were inaugurated in the use of rock phosphate in combination with red clover turned under during June. These experiments embrace the application of various quantities of phosphate rock with and without lime at the time the clover is turned under.

DEPARTMENT OF SOILS.

F. V. Emerson, Geologist.

The Louisiana Soil Survey has for its purpose the classification and mapping of soils; the making of chemical analyses in order to ascertain if any important elements of soil fertility are lacking; the investigation of the physical properties of soils by mechanical analyses and by experiments in order to study the texture of soils and the means by which the tilth may be improved.

In co-operation with other departments of the Experiment Stations, it is planned to carry on investigations on the adaptations of crops to different types of soils, the collection of information as to crop cultivation and methods on different soil types and the study of farm management and statistics.

The ultimate aim is to acquaint the farmer with the different kinds of soils and to help him handle each soil type in the best way; also to map the soils in the different parishes and publish descriptions to be sent to prospective immigrants and investors.

The work has been begun by a preliminary study of the alluvial soils of the sugar district. About seven plantations were surveyed and several hundred borings were made and noted. Samples of each soil type were collected and these are being analyzed both physically and chemically. Detailed information will be obtained to the end the definite and reliable information may be obtained about the different types. On two large plantations detailed chemical analyses have been, or will be, placed at our disposal and on several others information as to crop yields and methods will be compiled. This information will be recorded on cards so that it will be readily available Work has been started on a comparison of virgin soils and cultivated soils of the same type, so that we may know something of the changes brought about by cultivation. Arrangements have been made with several planters to try out on their plots various recommendations to be made and to observe and report the results.

INVESTIGATIONS IN SUGAR ENGINEERING.

E. W. Kerr.

In January, Bulletin 138, entitled "An Experimental Study of Heat Transmission and Entrainment in a Vacuum Evaporator," came from the press. This bulletin is a progress report of results from some 160 tests made in 1912 upon the experimental evaporator in the laboratory. These tests were made for the purpose of securing data regarding the effect of hydrostatic head, circulation tubes, length and diameter of heating tubes, varying the vacuum or the steam pressure, the presence of incondensible gases in the steam, the density of the juice, quality of the heating steam, etc., upon the transmission of heat, also to study conditions which affect entrainment in evaporators of the type used in sugar factories. This bulletin contains 72 pages of matter.

The data obtained in the tests of Adeline during the grinding season of 1912 were also worked into shape for publication during the early part of the year, though this matter has not as yet been printed in bulletin form for the reason that some of the tests had to be made over, and for the further reason that another series of tests along somewhat similar lines was yet to be made in other houses. During the spring and early summer, the experiments upon the laboratory evaporator were continued, some 170 tests being made in addition to those recorded in Bulletin 138.

These tests were made upon two types of evaporators designed with especial reference to the removal of incondensible gases from the heating steam and for obtaining high velocities of the heating steam. The results of these tests have been worked up and will be printed in bulletin form. The calandrias of the two types tested were built and donated for the experiments by the Sanborn Evaporator Company of New York, and Mr. A. L. Weber of New Orleans.

During the grinding season just ended, an extensive series of tests were made in various Louisiana sugar houses on different types of vacuum pans, multiple evaporators, and juice heaters, the object being to get first hand data regarding the transmission of heat in sugar house heating and evaporating apparatus under actual operating conditions. The different types tested were selected so as to include as much variety in design as possible. Some twenty sugar houses were visited at which more than fifty tests were made. This department is now in possession of a large mass of data which can now be worked up into permanent form for publication.

In addition to Bulletin 138, eight illustrated articles on sugar engineering subjects, averaging 2500 words each, have been written for sugar journals during the year. A paper of 2500 words, entitled "Tests on the Performance of Sugar House Machinery," was read before the Louisiana Planters' Association in February. A discussion of some 2000 words relating to the "Factors Affecting the Capacity of Evaporators" was made before the Louisiana Engineering Society in October. A paper of 12,000 words, entitled "Tests upon the Transmission of Heat in Vacuum Evaporators," was presented at the annual meeting of the American Society of Mechanical Engineers in December. This paper has already been published in the Journal of this society. The articles and papers mentioned above have been widely abstracted and in some cases reprinted in various sugar and chemical journals.

The amount of correspondence in this department is steadily increasing, some 400 letters having been written during the past year. Special exhibits, showing the work done by this department have been prepared and shown at the National Corn Exposition and at the Shreveport State Fair during the year.

The work of the year has been carried on with the assistance of Messrs. J. F. Gunther, A. J. Isacks and others, and much of the success obtained is due to their painstaking and faithful work.

SEED LABORATORY.

Cora C. Jacobs, Scientific Assistant in Charge.

The Seed Laboratory of the United States Department of Agriculture, co-operating with the Agricultural Experiment Station, was established in November, 1911, for the purpose of making purity and germination tests of farm seeds, for the farmers of the lower Mississippi Valley. During the year 1913, five hundred and seventy-three samples were sent to the laboratory. Of these, 138 were for purity tests, 53 for identification, 7 for examination and 513 for germination tests. The samples consisted chiefly of lespedeza, rice, cotton, and vegetable seeds, nearly all of which were submitted by farmers and seedsmen within the state.

This year the laboratory had an exhibit at the State Fair at Shreveport. Mounted samples showing the percentage of pure seed, weeds, and inert matter, in good and bad seed on the Louisiana markets, made apparent the benefits to be derived from purity tests. Germination tests showing the presence of old, immature, or damaged seeds in field and garden seeds were also shown.

Besides making purity and germination tests for planters and seedsmen, all seeds entering port at New Orleans are examined before they are landed. This prevents the importation of foreign weedy or adulterated seeds.

VETERINARY DEPARTMENT.

W. H. Dalrymple, Veterinarian.

Owing to a large share of the writers' duties having been taken up with teaching in the College of Agriculture, the carrying out of the purely research work has been attended to by Dr. Harry Morris, Assistant Veterinarian and Bacteriologist of the Experiment Station. The writer, however, has attended to a voluminous correspondence along veterinary and animal husbandry lines which have either come to him direct, or been referred by the director.

Such correspondence has included, not only inquiries from over the state regarding animal diseases of all kinds, but about breeds, feeding, and general care of live stock.

During the year response has been made to many requests for newspaper and scientific articles on topics of interest to the farmer and stockowner, as well as others.

A week was spent on an agricultural demonstration train operated jointly by the Texas & Pacific Railway Company, and the Experiment Station of the State University, the writer lecturing several times daily on the subject of improvement in our beef cattle, and the importance of the work of tick eradication.

A number of meetings throughout the state have been attended with the object of affording information along lines that would stimulate interest in the live stock industry generally, and as a result of some of these, several parishes have been induced to take up systematic tick eradication work.

The writer was present at the annual meeting of the Louisiana Lespedeza Growers' Association at Tallulah, and addressed the members on the nutritative value of lespedeza hay and its importance as a forage for both home consumption and for exportation.

In addition to state gatherings, the writer has attended meetings of a sectional and national character and delivered addresses.

Among these may be mentioned the meeting in New Orleans of the Association of Commissioners of Agriculture of the Southern States. An address was delivered at this meeting on "Southern Live Stock Possibilities," which was afterwards made a part of the annual report of the Louisiana State Board of Agriculture and Immigration, and was reproduced in a number of agricultural and other journals.

The writer attended the fiftieth anniversary meeting of the American Veterinary Medical Association in New York City, and took an active part in the proceedings. Returning to New York a few weeks later, he attended a joint conference between representatives of the great trans-Atlantic steamship lines and commercial bodies of the Mississippi Valley states, with the object of trying to induce immigration through the port of New Orleans, and he addressed the conference on that occasion. As a result of this conference, the Mississippi Valley Immigration Association was subsequently organized in the city of New Orleans, and at this meeting the writer delivered an address on Immigration, Foreign and Domestic, and How It Might be Secured. The address was published in a number of papers, and was prepared in folder form by the Baton Rouge Chamber of Commerce for general distribution.

The writer also attended the annual meeting, in Chicago, of the United States Live Stock Sanitary Association, and being on the program and some important committees, took an active part in the convention; and he represented the State University and Experiment Stations at the 1913 International Live Stock Exposition in the same city.

The interest manifested by our people in this department, including animal husbandry, as evidenced by the increasing number of inquiries and requests for general information, seems to indicate that they are devoting much more attention and serious thought to the betterment of live stock conditions throughout the state.

DEPARTMENT OF ANIMAL PATHOLOGY.

Harry Morris, Assistant Veterinarian and Bacteriologist.

ANTHRAX.

A general study of the subject has been continued both in the laboratory and field. Considerable data has been obtained on the life history of the organism while in the soil, water, and decomposing anthrax carcasses. During a severe local outbreak of anthrax, we were able to make a study of the methods of infection and dissemination. Special attention was paid to some of the blood sucking flies as possible carriers of infection and some valuable data was obtained. The milk from cows suffering with the disease was tested to determine whether or not the bacillus of anthrax was present in the milk before death, and if so, at what period of development of the disease it entered the milk glands.

By observing strict sanitary rules and the use of vaccines, not a case of anthrax developed among the station live stock during the past year, although the station farms have been infected with the organism in past years.

COTTON SEED MEAL POISONING.

With the Department of Plant Pathology, the study of the problems of cotton seed meal poisoning has been continued. This work has included feeding experiments with cotton seed meal and cotton seed kernels treated in various ways. By experimenting with rabbits we were able to discover ways by which the toxicity of the meal could be reduced to such an extent that it could be fed for long periods of time without injury to the animal. Hogs were then used in the tests and the same results obtained. Some of the feeding experiments have run for one hundred days with the hogs making good gains in weight and showing no signs of poisoning. This subject is being continued and we hope to make a report of the work during the coming year.

Some attention has been paid to the dog disease commonly known as ''sore mouth,'' or ''black tongue.''

Besides the diseases mentioned in the above paragraphs, we have had the usual work of a bacteriological laboratory. During the last year we have diagnosed several cases of rabies and tuberculosis in animals, and have examined several hundred blood smears for anthrax. We are perfectly willing to do this work for the people of the state, but such information should be obtained from the Secretary of the Live Stock Sanitary Board, for which purpose the board was created. The Secretary makes a general survey of the diseases in the state and quite often his work is interfered with and valuable time is lost because communications are sent to the station instead of the Sanitary Board.

HORTICULTURAL DEPARTMENT.

George L. Tiebout, Horticulturist.

Investigations and demonstrations in the production and marketing of various truck crops have been continued during the year. The growing and marketing of winter cauliflower has received special attention. As a result of farmers and truckers observing our former efforts of last year, over fifty growers planted cauliflower this year for the first time. Much individual attention was given the new growers through correspondence, demonstration, lectures at the association meetings and visits to the fields. Unfortunately, our plantings this season, as well as those of many growers, were very seriously damaged by the abnormally rainy weather of August and September.

A quantity of our damaged stock not fit for shipment was put up in salt brine for pickles, with the view of testing the practicability of using inferior stock in this way. Experiments in the production of spring cauliflower have so far been unsatisfactory.

Results indicate that bell peppers are a profitable summer truck crop with a somewhat limited demand in the North. In mid-summer when shipments become unprofitable, large quantities of fruits go to waste and we hope to find an outlet for this surplus in "pickled mango peppers."

Our department has continued to assist other departments in their work by helping to provide material for experimental purposes and for carrying out practical demonstrations in the control of plant diseases.

Data regarding the cost of producing and marketing various truck crops is being furnished for compilation by the Department of Commerce, Louisiana State University.

Correspondence has been mostly regarding truck crops, especially cauliflower. Demands for special lectures before truck associations and visits to trucking sections to investigate special problems, have been consistently met. We were represented at the convention of the Vegetable Growers of America, at Toledo, Ohio, and assisted in installing and caring for the exhibit of the stations at the State Fair and in judging the general vegetable exhibits.

Bulltin 140, "A Preliminary Report on Winter Cauliflower," was published during the year. A Press Bulletin, "Tomato Growing for Home Uses and for Canning," was issued for the Girls' Canning Clubs.

DEPARTMENT OF PLANT PATHOLOGY.

C. W. Edgerton, Plant Pathologist, and C. C. Moreland, Assistant Plant Pathologist.

The work in the Department of Plant Pathology has continued along the same lines as in previous years. Several of the particularly troublesome diseases of the state are being carefully studied.

THE DISEASES OF THE BEAN.

The diseases of the bean have been studied for several years and the results which have been obtained have been published from time to time. During the early part of 1913, Bulletin 139 on the "Bean Blight and the Preservation and Treatment of Bean Seed," was published. This gave the results which had been obtained during the past two seasons. Not much time is now being spent upon these diseases, although we expect to carry on a few experiments the coming year to get some data on a few points not yet settled. Our work has shown that the bean anthracnose can be entirely eradicated and the bean blight greatly reduced under Louisiana conditions.

COTTON BOLL ROTS.

The study of the boll rot diseases was practically completed in 1912, but a few experiments on the cotton anthracnose are still in progress and will be continued during the coming season.

SUGAR CANE DISEASES.

Much attention has been given to sugar cane diseases during the past season, especially to the red rot, the stem rot, and to the fungi which decrease the germination of cane. An article entitled, "The Stem Rot or the Hawaiian 'Iliau' Disease of Sugar Cane," was published in Phytopathology during the year. This is the first published report of this disease in the United States. The work on all of these troubles will be continued.

TOMATO DISEASES.

Two diseases of the tomato, the wilt and the early blight are particularly troublesome in this state. Attempts to select wilt resistant strains for use in wilt infected land have given some promising results. We have procured a strain which is very resistant, though it is not just the type of tomato which we desire in this state. Successful crosses of this strain with the Earliana have been obtained and we hope to obtain a variety that is not only wilt resistant, but is also early and prolific. Bulletin 142 on "The Diseases of the Tomato in Louisiana," was published in October, 1913.

EGG PLANT DISEASE.

The eggplant disease, caused by *Phyllosticta hortorum,* is often troublesome in the state and a study of it has been made during the past two years. We have obtained considerable data regarding the life history of the fungus and also the methods of control. This study, however, will have to be continued at least another year before the data will be ready for publication.

Besides the diseases mentioned in the above paragraphs, some attention has been paid to the *Sclerotium Wilt Disease,* the Damping Off Disease, the Cotton Wilt and to a general study of the various anthracnose diseases.

The study of the problem of cotton seed meal poisoning has been continued during the past year in co-operation with the Department of Animal Pathology. This project will be continued during the coming year.

A small amount of time has been spent on a plant disease survey of the State, on correspondence and on the preparation of exhibits. Exhibits were prepared for the State Fair at Shreveport, and also for the National Corn Exposition at Columbia, S. C. The writer was with the station exhibit at the National Corn Exposition and he also attended the meetings of the American Association for the Advancement of Science at Atlanta, Georgia, in December. At the latter place a paper was presented before the Botanical Society of America. This paper will be published during the coming year.

DEPARTMENT OF ENTOMOLOGY.

E. S. Tucker, Associate Entomologist.

The investigation of insects infesting stored rice and its by-products was continued from the preceding year and comprised the principal project for entomological research work. A considerable amount of information and material has been obtained relating mainly to the life history of the rice weevil, lesser grain borer, cadelle, rust-red flour beetle, and Angoumois grain moth. Observations have also been made upon other species, including the rearing of different parasites. When all of the specimens on hand become fully identified, the list of primary infesting species will then somewhat exceed the number formerly reported. For reference, see author's articles Nos. 1 and 2.

The assistance of an artist has proved to be quite advantageous, but the consideration of the many species occurring in rice stock has by no means reached a perfect conclusion in any case. A long time will be required for the thorough completion of the work.

One other project was proposed as an exigency and it met with approval. Under the title of "Investigation of the southern corn root worm and distinguishment of other root-attacking forms of insects occurring in association," it is outlined as follows:

1. A study of the development, habits, seasonal history, distribution, and possible parasites and other enemies of the species, with reference to the occurrence and destructiveness of the larva on corn and other cultivated plants grown under Louisiana conditions.

2. Identification and account of associated forms of insects occurring with the above root worm under similar circumstances in which they are liable to be mistaken by farmers for the species mentioned.

Owing to the prevalence of this insect in various sections of the state during the past spring, planters and gardeners suffered extensive losses caused by attacks of the pest in both its larval and adult stages. The discovery of larval borings in potato tubers revealed a new habit of the foe. In giving information and a record of complaints, together with personal observations regarding this enemy, the entomologist has issued three papers, which are listed under his contributions for the year as Nos. 3, 5 and 9.

Appeals for information concerning injurious insects in general and means of controlling them has called for quite an amount of correspondence in efforts to give helpful replies. Determination and preservation of specimens received, with preparation of records of same, have necessarily occupied much of the entomologist's time. The numerous demands made upon the entomologist show that the people of the state are earnestly seeking advice to apply for protection against insect enemies.

In response to urgent requests, the entomologist has made field trips in localities to investigate occurrences of destructive insects and to determine if possible what methods for combating them could be most practically employed. Exhibits have also been furnished for fairs and visitors.

Among the several duties falling upon the entomological department, the incumbent's service rendered in compliance with the Fruit and Crop Pest law has interfered heavily with Experiment Station work. Legislative Act No. 36, of 1910, makes the entomologist of the Louisiana State Experiment Stations to be entomologist of the Louisiana State Board of Agriculture and Immigration, and charges him with the inspection of nurseries, execution of plant quarantine work and all matters of an entomological nature as specified by the Act, Rules and Regulations. Mr. J. B. Garrett, who formerly acted in this capacity, was transferred on February 1, taking charge of the Calhoun Station.

As many as 94 certificates have been issued with a limit expiring September 1, 1914, and the entomologist has traveled over the greater part of the state to visit the places for inspection before granting a certificate in each case. A rather unusual amount of imported stock has also been duly inspected on its arrival in New Orleans.

Since the law aims to prevent introduction and distribution of enemies on nursery stock, and requires extermination of dangerous pests when possible, the entomologist has had to deal with some occurrences of serious foes. Common among these is the San Jose scale, against which treatment for eradication was directed in the instances, and in one case, a certificate was refused.

A grave menace in the form of the cottony cushion scale was discovered near New Orleans. Although the entomologist took prompt action for the suppression of this insect, he had considerable difficulty in getting owners of the infested orange groves to fight the pest according to instructions. Final compliance with orders, however, has resulted in the vanquishment of the foe.

Owing to the dangerous nature of the scale, its spread if permitted to extend beyond the bounds of control in Louisiana, would unquestionably inflict another very serious blow upon the agricultural interests of the state. The discovery that it thrives on pecan, mulberry, and a number of heretofore unrecorded host plants, makes it especially perilous. Should it gain a hold on cypress and pine, on which it is said to live, our timbered regions would be endangered.

Better provision than is at present afforded for the protection of the forestry, horticultural and other crop growing interests of Louisiana is of great importance. While the law is fairly adequate in giving police power to the entomologist, yet he cannot divide his services between two offices sufficiently to give proper attention to work on either side. The duties of his department in the Experiment Stations alone are more than one man can handle with full satisfaction. Some means of providing relief, particularly in the way of capable assistance, to meet the pressing situations cannot be too strongly advocated.

With the opening of the Panama Canal, the risk of introductions of pests on products brought aboard ships docking at our ports will be greatly increased. The only protection now furnished against such danger depends on the United States Customs officers acting under the Federal Quarantine Act, except as the State Entomologist can certify to importations entered under permit.

The entomological contributions prepared under the authorship of the writer and printed during 1913, are as follows:

Department of Entomology. (Progress of investigations in 1912.) (La. Agri. Exp. Stations, 25th An. Report.)

The Injury of Stored Rice by Insects. (Rice Journal and Southern Farmer. April.)

The Southern Corn Root-worm. (La. Agri. Exp. Sta. Press Cir.)

Pests of the Household. (Country Review, 11 weekly parts.)

Prevalence of Southern Corn Root-worm in Louisiana. (Rice Journal and Southern Farmer.)

Rice Water-weevil at Lights and in Stored Grain. (Rice Journal and Southern Farmer.)

Controlling Rice Weevil in Grain. (Country Review.)

Leaf-cutting or Parasol Ant. (Country Review.)

Additional Reports Concerning the Southern Corn Root-worm. (Rice Journal and Southern Farmer.)

Farmaldehyde Gas Not Effective Upon Flies. (Trans. Kan. Acad. Sci., v.25.)

Further Records of Insects Personally Collected in Kansas and Colorado. (Trans. Kan. Acad. Sci., v.25.)

A system of Notation Applied to Entomological Accessions. (Trans. Kan. Acad. Sci., v.25.)

FERTILIZER AND FEED STUFFS LABORATORIES.

The work of the laboratories for the analyses of samples of feed stuffs and fertilizers is largely routine work. The results of analyses of fertilizers has been published in regular form, making a bulletin of 102 pages. The material for the bulletin on feed stuffs analyses has been in the hands of the printer for about two months and will soon be ready for distribution. This report is more voluminous than the fertilizer report.

We have made 2372 separate analyses, not counting the repeats, for fertilizers, representing 9,230 samples sent to the laboratory.

The total number of feed stuffs analyzed was 3,467, representing 12,226 samples sent to the laboratory.

Fifty-four samples of Paris green and 106 miscellaneous samples have been analyzed.

The methods followed by other states in this work and by the Federal Government in food and drug inspection, seems to be by far less expensive and just as efficient. We are the only state having a law for the inspection of fertilizers and feed stuffs that does not go out into the open market and get the samples.

I earnestly suggest that you give consideration to this matter so as to have the Legislature take it up in whatever manner seems most expedient.

DAIRY DEPARTMENT.

C. H. Staples, in charge.

The work at the Experiment Station dairy for this year has consisted of feeding experiments for milk production, rearing calves, determining the amount of fertilizer produced by the dairy herd for a given length of time, the advantages of grinding feeds, such as hay and corn.

Root crops have been grown and fed to the dairy herd in comparison to pasturage for milk production, with satisfactory results. The principal root crops grown are the mangel wurtzel, sugar beets, rutabagas, and sweet potatoes. The mangel wurtzel proved to be the best milk producer of all the roots, and is equal to good pasture grass. It was found that where a small area of land is available, such as is the case at the dairy, it is more profitable to grow roots for feeding than to use the land for pasturage, as more succulent feed can be grown. It was found that sweet potatoes are good milk producers, but unless a very large yield can be obtained the price of the potatoes on the market will prohibit their being fed to dairy cows.

Silage has been fed to a considerable extent. The principal crops used for silage were, corn, soy beans, and sorghum. Corn was found to be the best single crop to grow for silage, while corn and soy beans combined proved to be the best two crops to grow together for silage, and these two crops when put in the silo together make the best silage that has been fed. Sorghum has proven to be a good crop for silage, making a larger tonnage to the acre than corn, but being less valuable as a feed for the cows.

Six of the cows in the dairy herd have been put on authenticated test with the American Jersey Cattle Club of New York, two of which have already made sufficient amount of butter-fat to enter the register of merit, and the others will produce enough to enter the record by the time their test period closes.

By experiment conducted by the writer to determine the amount of manure and urine produced by the dairy herd in one year, it was found to be, 175 tons of manure and 70 tons of urine. The average amount of manure produced by one cow in a year was 17,520 pounds, and the average amount of urine produced by one cow in a year was 6,935 pounds. This experiment shows the value of the farm manure to the dairyman.

Considerable attention was given to feeding dairy calves, and ten heifer calves have been raised during the year which are kept by the dairy for increasing the size of the herd. Seven pure bred Jersey bull calves have been sold to the dairymen of the State.

The work carried on in the field has consisted of building silos, dairy barns, attending fairs for the purpose of judging dairy cattle, giving demonstrations in making the Babcock test, keeping records of the dairy herd, making butter, etc. Several of the agricultural high schools have been visited and the herd record work taken up with the students with home herds.

During the year, and since July 1, when the field work was started in co-operation with the Bureau of Animal Industry, U.

S. Department of Agriculture, the writer has assisted by furnishing plans and specifications, and personal visits, in building ten silos and five dairy barns, has kept a record of the milk and butter-fat production of four dairy herds by doing the actual work, and has assisted in the keeping of records of a number of herds with the students of the agricultural high schools.

A large number of plans for building dairy barns and silos have been sent out during the latter part of the year for 1914 construction.

A dairy cow demonstration was conducted for seven days at the State Fair with the dairy cows there, by keeping a daily record of the feed fed each cow, and the milk and butter-fat produced. The object of this demonstration was to show the value of keeping such records of the dairy herd to eliminate the poor cows. Demonstrations in judging dairy cows and filling silos were also given. The interest manifested in these demonstrations by the dairymen was very satisfactory, and sufficient to warrant their being continued each year.

The work carried on by the Louisiana Jersey Breeders' and Dixie Dairymens' Associations has been very good. These meetings have afforded the dairymen an opportunity to discuss problems of mutual interest. The meetings have all been well attended by the dairymen and many new names have been added to the rolls of membership.

The value of the dairy herd at the station has been increased to a considerable extent during the year, and by proper breeding and elimination of the poor cows a very valuable herd of dairy cows will be obtained in a few years.

The field work for 1914 promises to equal that carried on in many of the other states where the work has been in progress for a number of years.

During the year a stave silo was erected at the dairy farm.

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS.

W. G. Taggart, Assistant Director.

I submit herewith a report of the Sugar Experiment Station for the year 1913.

At the beginning of this year, Director Dodson formulated a plan for all the work at this station. This plan incorporated in it the experiments which had not been carried to a satisfactory conclusion, or all that had previously shown some feature to make us think that they might yield results of a beneficial nature.

All of the fertilizer experiments were continued, and the unusually good weather at the harvest time aided us in getting much data which we think will be of benefit, and which helped to fix some of the new fertilizing materials in their proper place. New fertilizer tests consist of adding Norges Nitrate (nitrate of lime) to the list of nitrogenous materials as a cane fertilizer, and various mixtures on plots planted to corn. On cane, Calcium cyanamid continued to give good results, but in case it was desirable to use it as the only source of nitrogen in a cane fertilizer, it has one drawback—two applications of fertilizer would be necessary. Calcium Cyanamid cannot be mixed in large enough quantities with acid phosphate, without damage to the mixture, to make a fertilizer with the proper percentage of ammonia, and for that reason where these two materials are to be used, first, acid phosphate must be applied, and then Calcium Cyanamid at a later date. Norges Nitrate gave results that indicated that it, too, would prove a satisfactory source of ammonia. At present this material has to be secured from Norway, and it is only of interest to us as a possible source of ammonia when the present supplies of that important plant food have been so exhausted that we can no longer afford to buy them for use as fertilizer. The experiments with varying amounts of phosphoric acid checked nicely with the figures secured last year, and we will continue them at least another year before we will have data enough to be satisfied.

All of the 143 foreign cane varieties are retained in small quantities, and while many of them will never be of commercial value to Louisiana, we are able to supply cuttings of them to many of the experiment stations and others in foreign countries in return for similar favors. Three new foreign varieties were secured this year, and one of them has already shown that there is some commercial value attached to it.

One hundred and forty-eight of the Louisiana grown seedlings are retained as promising, and the ten most promising of these are planted in some quantity, and we expect to send out cuttings of these to some of our plantations next fall.

Twenty-five new Louisiana seedlings were transferred from the hot house to the field, and we now have about four hundred more growing under the care of Mr. A. E. Weller. These will be put in the nursery beds during the spring of 1914.

During the year, cane seed and cane cuttings were received from the following persons: Experiment Station, Santiaga de las Vegas, Cuba; Prof. J. R. Bovell, Superintendent of Agriculture, rBidgetown, Barbados, B. W. I.; H. W. Cousins, Dept. of Agriculture, Kingston, Jamaica; S. M. Bowman, Ganahl, Mexico; Francis Eschauzier, Rascon, Mexico; Sugar Experiment Station, Pasoeroean, Java; Dr. Longfield Smith, St. Croix, D. W. I.; Harvard Experiment Station, Cienfuegos, Cuba.

Further fertilizer tests on corn go to show the necessity of applying nitrogen to our heavy soils. The use of bagasse and green manure, were other experiments started on corn, but they have not been carried far enough yet to yield results.

Realizing the advantage to be had from growing a white flint corn in the southern section of this state, an attempt was made to get such a corn by means of seed selection, and the result was even better than we could have expected. We are now fairly sure of growing a white weevil-proof corn, practically within a short time.

A good deal of attention was given to forage crops, especially legumes. Alfalfa, crimson clover, red clover, soy beans, and several varieties of velvet beans, and kudzu were grown.

By the use of a special appropriation by the last Legislature, we have made some valuable repairs to our sugar house, and this has enabled us to do better and cheaper work during the grinding season.

The ''Luce'' cane harvester was tried out and demonstrated before some of the leading sugar planters. The step forward that Mr. Luce has made cannot be overestimated. For twelve years he has been at work on a machine to harvest sugar cane and now he has a machine which cuts, strips, and tops cane, on a commercial scale, almost as well as it can be done by hand.

Besides the research work reported elsewhere, the chemical department has made forty-six analyses of soils, waters, fertilizers, etc., for citizens of Louisiana.

The United States Bureau of Entomology has added one man to their force, and they co-operate with us. Their work consists of studies of the life history of sugar cane insects, damage suffered by crops, distribution of insects, experiments with methods of controlling the ant, symbiosis betwen the ant and certain injurious insects, such as the sugar cane mealy-bug. Field examinations have resulted in the discovery of at least one egg parasite which, at least for one season, gives strong evidence of being a great aid in controlling the destructive cane-borer. Experiments under Mr. Holloway on our grounds showed that where this parasite was encouraged, it decreased the infestation of cane by the borer from 67.5 to about 15.5 per cent. While on two adjoining plantations in Texas, the same gentleman found that the infestation was reduced from 76 to 50.5 per cent. The bureau also took the advantage offered by our grounds to carry on some special experiments to control the house fly.

As usual, the fourth-year students from the State University spent the grinding season here. The demand throughout Louisiana for chemists proved so great that those in authority allowed a large percentage of the students to go out on plantations.

The annual field day meeting of the Louisiana Sugar Planters' Association was held on our grounds on June 12th. A good attendance was had and papers were read by Dr. W. C. Stubbs, Director Dodson and Mr. I. H. Morse of the Louisiana Sugar Co. An exhibit of agricultural implements and sugar house machinery was gotten up for the occasion, and unusual interest was shown in this especially the tractions plows operated by the Minn. Steel and Machinery Co.

The station has sent out on request, cuttings of cane to Mexico, India, Paraguay, St. Croix, D. W. I., Java, Mississippi, Florida, New York, and to a number of Louisiana planters.

The station mailed 1194 letters on station business and answers to inquiries, 1299 bulletins on request, 1015 postal cards, and 35 packages of miscellaneous samples and specimens.

REPORT OF THE CHEMICAL DEPARTMENT.

W. E. Cross, Research Chemist.

The work of the chemical department has been carried out in continuation of the work of the previous year, the projects being (1) the clarification of cane juice; (2) the analyses of cane products; (3) the utilization of by-products in the manufacture of cane sugar.

The work on the analysis of cane products, a bulletin on which was published in December of last year, has been continued, in the endeavor to solve certain difficult problems, e. g., the analysis of sugars containing levan, etc., that confront the sugar chemist. A resume of the work done in the clarification investigations was published in May, and this work is being continued in the present grinding season. In the investigation the clarification of cane juices for the manufacture of white sugar for direct consumption is being thoroughly studied from the chemical and technical points of view, and it has been endeavored to evolve the best methods of applying the carbonation and sulphitation processes to Louisiana juices. Besides this, various new methods of clarification have been taken up and studied. It is intended to publish a full account of this work in bulletin form, immediately after the close of the present grinding season.

In the work on the utilization of sugar cane by-products, we have a subject of extreme importance, as successful methods of utilizing the molasses, filterpress cake and bagasse to greater profit than at present, would be of great service to the sugar industry. The work done was confined mainly to molasses, and possible methods of extracting the sugar contained therein, and methods of preparing organic acids of high market value were investigated with encouraging results. The preparation of lactic acid and butyric acid received special attention and much progress was made in the attempt to evolve new methods which would be commercially profitable.

The publications of the year include a long account of the work of the past two grinding seasons, entitled "Experiments on Clarification," and another entitled "Some Aspects of the Sour Cane Question." The papers were presented on different occasions to the Louisiana Sugar Planters' Association, and thereafter published in the various scientific journals.

The writer attended the National Corn Show in Columbia, S. C., in January, in charge of an exhibit from the Sugar Station illustrative of the scientific research work of the station. A similar exhibit was prepared and sent to the Louisiana State Fair at Shreveport.

The writer has been appointed Referee on Sugar and Molasses Methods for the Association of Official Agricultural Chemists for the fourth successive year. In the work, the referee receives the co-operation of eminent sugar chemists throughout the country on various problems of analytical sugar chemistry.

The correspondence of the department has been considerable, and we have been able on several occasions to offer useful advice on questions of analytical methods of chemical control, and other problems in sugar house work to many people engaged in the sugar industry in the state.

BACTERIOLOGIST'S REPORT.

W. L. Owen, Bacteriologist.

During the period covered by this report, favorable progress has been made in the several investigations undertaken, some of which having been completed and others having reached a stage where an early completion is to be expected. The scope of the work of this department during the past year has been much broader than in previous years, and the results of the various investigations undertaken furnish a broader basis upon which to establish practical measures for the elimination of losses from sugar deterioration.

INVESTIGATION OF THE DETERIORATION OF SUGARS.

This investigation has received much attention during the past year. A large number of experiments were conducted upon the deterioration of various types of sugar, under varying conditions of moisture, and with various types of bacteria used as the inoculating material. Many interesting and significant results were obtained upon the influence of moisture upon the rate of deterioration of various types of sugar. Newly discovered microorganisms in sugars, which seem to have been overlooked in all former investigations, showed a marked ability to induce a very rapid deterioration of both raw and plantation white sugars. It is believed that the importance of sugar deterioration will be even more fully appreciated when the manufacture of plantation white sugars becomes more general throughout the state. It has been found that soft white sugars, which are allowed to absorb moisture, often deteriorate much more rapidly than lower grade sugars.

INVESTIGATION OF THE COMPARATIVE VALUES OF VARIOUS CULTURE MEDIA FOR THE QUANTITATIVE DETERMINATION OF MICROORGANISMS IN VARIOUS SUGAR HOUSE PRODUCTS.

Owing to the lack of thoroughly tested methods for the determination of the number of microorganisms in sugar house products, and the importance of such determination for the production of sugar of good keeping qualities, an extensive investigation of this subject has recently been completed. Various culture media were tested upon juices, molasses and sugars, and the results obtained will be submitted for publication within the near future.

INVESTIGATION OF THE FERMENTATION OF CANNED SYRUPS.

During the past year an investigation of the causative agent of the fermentation of cane syrup was completed. The annual losses from this source throughout the state are unnecessarily high, and the danger of such losses tends to deter many planters from engaging in the manufacture of syrup on a small scale who otherwise would be attracted by the profits in supplying the northern market. It was found that the principal cause of the fermentation is a species of yeast, characterized by its exceptional ability to withstand high temperature and its power to ferment highly concentrated sugar solutions. The characteristic "puffing" of cans containing syrup results from the large quantity of gas formed during the fermentation, which makes it a particularly destructive type of fermentation owing to the damage to the containers. It was found that an exposure to a temperature of 90° for fifteen minutes was necessary for the destruction of this yeast. As a practical recommendation for the elimination of this trouble, more emphasis should be placed upon the maintenance of cleanliness in the factory by the rational use of suitable disinfectants than in the implicit reliance in any method for the sterilization of the finished article.

INVESTIGATION OF THE RELATIVE VALUE OF VARIOUS DISINFECTANTS FOR USE IN SUGAR HOUSES.

The previously ascertained fact that the bacteria causing the deterioration of sugars gain access to these products in the factory and that the extent of infection of sugars is almost invariably referable to the condition of cleanliness of the factory in which it is made, has seemed to warrant an investigation of the most suitable disinfectants to be used for the purpose of preventing the development of destructive bacteria in sugar factories. Investigation of the action of various disinfectants, including formaldehyde, chloride of lime, bisulphide of soda, milk of lime, sodium and ammonium fluoride, upon raw juices, has been in progress throughout the past grinding season. The influence of elevated temperature upon the efficiency of various disinfectants has also been noted. It is proposed to include molasses and raw sugars, as well as distinct species of various organisms, in the list of material upon which the disinfectants are to be tested. The purpose of this investigation is to establish by an intensive investigation the most efficient method for the elimination of destructive bacteria from the sugar house.

INVESTIGATION OF THE MICROORGANISMS IN SUGAR HOUSE PRODUCTS.

Sugar bacteriology being a comparatively undeveloped field of scientific research, little attention has as yet been devoted either here or elsewhere to the classification of the microorganisms constituting the flora of cane juices and molasses. Believing that such an investigation would lead to a better understanding of the relative susceptibility of these products to the various types of fermentation to which they are subject, an effort is being made to determine the various species of microorganisms occurring in these products. With this in view, a large number of samples of raw juices and final molasses have been procured from various parts of the state, and transfers have been made from them to various types of culture media. This work will be continued throughout the coming year.

On the whole, the progress of the investigations of this department during the past year may be considered as quite encouraging as regards the results obtained, and the value that these results promise to be to the sugar industry.

PUBLICATIONS.

"The Occurrence of *Saccharomyces Zopfii* in Canned Cane Syrup, and Variations in Resistance to Heat When Grown in Solutions of Varying Densities" (Cent. fur Bakt.).

The Relation of Bacteriology to the Cane Sugar Industry. (A paper read before the Am. Bacteriological Society at its annual meeting, December, 1913.)

An Investigation of the Relative Values of Various Culture Media for the Quantitative Determination of the Microorganisms in Sugar House Products.

Station bulletin in course of preparation for publication.

NORTH LOUISIANA STATION, CALHOUN.

J. B. Garrett, Assistant Director.

The work at this station has been of a similar nature to that of previous years with some additions and an extension of the work in general.

The work has included rotation experiments, variety tests of corn, cotton, cow peas, peanuts, sweet potatoes, soy beans and Irish potatoes, and fertilizer experiments with these crops, cultural experiments with the principal crops adapted to this section, pork production by grazing corn and cow peas, peanuts, soy beans and sweet potatoes, soil improvement work, experiments with vegetable and truck crops adapted to this locality and a continuation and extension of the orchard and vineyard work.

COTTON.

Cotton is, and will continue to be, the great cash crop of North Louisiana, and, therefore, this crop has received increased attention. There are two important rotation experiments on the station in which cotton is included. One of these experiments has been in operation since the establishment of the station, and has attracted wide attention. It is a three-year rotation, including corn and cow peas, followed by oats and peas, followed by cotton. A crop of crimson clover follows the oats and peas and is turned under in the spring preceding the cotton crop for soil improvement. A home-made compost which includes stable manure, cotton seed and acid phosphate is applied to one-half of each of these rotation plots. The yield of all crops on the portions of the plots which have received the compost has averaged much higher than on the portions where no compost was applied.

Another three-year rotation, which was begun this year, includes corn and cow peas, followed by cotton, followed by crimson clover, followed by velvet beans. The velvet bean vines are turned under in the fall and one-half of each plot receives raw rock phosphate, and the other half receives acid phosphate for the improvement of the soil.

In the variety test, twenty-three known varieties of cotton were included. These were varieties that have been bred and selected for earliness and prolificacy, for boll weevil infested sections. A few upland long-staple varieties were also included in the test. On account of unfavorable weather conditions the first planting was lost and the second planting could not be made until May 5. The lowest yield was 676 pounds of seed cotton per acre for Hartsville No. 7, an upland long-staple variety, and the highest was 1398 for Gandy, a variety which has been grown and selected in North Louisiana for several years. It is a selection from Rublee. The seed of the three highest yielding varieties was secured from farmers in North Louisiana who have been selecting their seed for a number of years. This demonstrates that home-grown and carefully selected seed are more productive than seed grown in distant sections where soil and other conditions are probably different.

Fertilizer experiments and experiments with different width rows and different numbers of stalks in the hill were also conducted.

On all cotton experiments on the station 12,936 pounds of seed cotton were produced which gave eight bales averaging over 500 pounds each.

CORN.

A considerable acreage of the station has been devoted to corn experiments.

In the two rotation experiments mentioned under cotton, corn is included. Seventeen varieties of corn were included in the variety test and the yield varied from 28.5 bushels for Extra

Early to 44.00 bushels for Stewart's White. The highest yielding variety has been grown and selected in North Louisiana for a number of years. All of the seed of these varieties was produced in the South and the majority of the varieties came from Louisiana corn growers who have been giving their attention to the selection and improvement of seed corn. The home-grown seed has proven to be most productive and best adapted to the conditions here.

The experiment in which the different methods of cultivation are tested was again conducted. The results were slightly in favor of planting below the level and cultivating to a ridge or bed.

From our corn experiments 942 bushels were harvested and it was estimated that 111 bushels were grazed by the hogs in pork production experiments.

CRIMSON CLOVER.

The work with this crop has been continued, and the acreage devoted to it has been considerably increased the past fall. Home-grown seed were planted exclusively. The growth made in the spring of 1913 was splendid, and an average of about 2¼ tons per acre was secured.

ALFALFA.

A nice growth was made in the spring and summer, but the excessive rainfall in September produced a very heavy growth of crab grass and the alfalfa stand was seriously injured. This necessitates replanting in the fall. This year's results again demonstrated the necessity of inoculation for the production of this crop on the hill lands. From the three one-fourth acre inoculated plots 2.64 tons of hay were harvested, whereas no yield was secured from the plot that was not inoculated.

SWEET POTATOES.

Year by year the acreage in sweet potatoes is being increased in North Louisiana. The demand is increasing for the products for table and canning purposes, and large quantities of potatoes are being grown for pork production. This year our work with this crop has been materially increased. About 6½ acres were grown for pork production and 1½ acres were devoted to fertilizer experiments and variety tests.

In the fall, the markets are usually well supplied with sweet potatoes and the price is not so good as in the spring and early summer. The common methods of storage have been wasteful and unsatisfactory. In order to ascertain the best methods of keeping this crop over winter for the higher prices, a modern storage house has been constructed on the station and experiments are being conducted along this line. At the present time there are about 190 bushels stored in this building and they are in a perfect state of preservation. Several bushels are banked in the usual way to test the comparative keeping qualities under the two methods.

This building is 10 feet high, 12 feet wide and 16 feet in length and was constructed at a cost of about $140.00 complete.

GENERAL VARIETY PLOT.

For the purpose of testing the adaptability and probable commercial importance of a large number of crops which have not been grown here before, or are not generally grown, a plot was devoted to crops of this nature. Sixty-three different kinds of crops were grown. This plot was quite interesting to the visitors and furnished considerable data for the records of the station.

HORTICULTURAL WORK.

Mr. E. J .Watson, Horticulturist of this station, has had direct charge of the work and it has been a continuation and expansion of the work which has been in progress for the past few years.

GENERAL WORK WITH FRUITS.

This has included the following:

1. Commercial methods of grape culture. For this work one acre has been set out to Ives, Niagara, Concord and Delaware. These varieties have given best results up to the present time here.

2. Variety work with grapes. Sixty-two varieties are now growing in the vineyard, ranging in age from two to five years.

3. Spraying versus enclosing the bunches of grapes in small paper bags for the control of black rot has been tested. The bagging gave as satisfactory results as spraying with Bordeaux

mixture at a much lower cost. This, however, only represents one year's results.

4. Growing pears of blight-resistant qualities. Twenty trees representing six varieties are now growing in the orchard. Twelve of these are from a very large, prolific tree which stands on the Sugar Experiment Station grounds at Audubon Park. This tree has never shown any indication of blight. Several varieties have already been eliminated from the orchard here by the blight.

5. A continuation of the work with seedling peaches. At present there are 129 seedling peach trees in the orchard and a large number that proved to be of little value have been removed during the year.

6. Commercial work with peaches and variety testing. There are 164 budded trees in the orchard representing eighteen standard varieties.

7. Spraying for insects and fungi.

8. Collecting seedling plums and testing varieties. There are 99 trees representing 12 varieties in the orchard.

9. Testing figs for commercial purposes. There are in the orchard 227 magnolia fig trees which were grown from cuttings set out in March, 1913. Very unfavorable conditions followed their planting, but they made good growth and produced a crop of figs in the late fall, the last ripe fruit having been gathered on November 17. Twelve hundred cuttings will be planted in the orchard this winter.

10. Variety work with pecans. The pecan acreage in the South is rapidly increasing and a great interest is being manifested in this industry. There are 50 grafted trees representing 21 varieties now growing in the orchard.

11. Variety work with apples. A collection of varieties that have proven to be best adapted to this section had been made and 128 trees representing 26 varieties are now in the orchard. Some of these have borne and have given very satisfactory results. A number of young grafted trees representing five other varieties are now growing in the nursery and will be planted in the orchard later.

12. Growing small fruits.

GENERAL WORK WITH VEGETABLES AND TRUCK CROPS.

Irish Potatoes.

1. Variety test. Thirteen varieties have been used in this test for the past three years, and their production, resistance to disease and adaptability to conditions noted. Some varieties have been vigorous, have produced well and have shown themselves well adapted to our conditions, whereas other varieties have shown that they were not adapted and have produced very light crops.

2. Selection work. For the past few years this work has been in progress, and the average yield on the selected plots has been considerably higher than on those where the seed has not been selected. This season the two Triumph plots were about equal, but the selected seed in the Early Ohio gave about 18 bushels per acre more than the unselected seed.

3. Home-grown vs. bought seed. This experiment has been conducted for a number of years, and each year the home-grown seed has given the greatest yield. However, the northern seed this year produced 27 bushels per acre more than the home-grown. This was due to the fact that the home-grown seed was not mature.

4. The Lookout Mountain potato. This variety is especially adapted to the production of a fall crop. Seed may be easily kept from fall until the following July for the fall crop. This variety was planted here on July 26 this year and the cut tubers produced 75 bushels per acre and the whole tubers 144 bushels per acre.

Cantaloupes.

Variety tests have been conducted and the improvement work by seed selection has been continued.

Tomatoes.

Variety tests, canning work, and seed selection for disease-resistant plants.

A considerable amount of work of a general nature was conducted with the most important garden vegetables and truck crops.

CORRESPONDENCE.

During the year 875 letters and 38 postal cards were written from the office in regard to the business of the station and in reply to communications from farmers and other parties who asked for information. About 1000 form letters were written on the multigraph and mailed out, and a great many bulletins were also sent out in connection with the correspondence.

SHORT COURSES.

The Assistant Director of the station visited the Agricultural High Schools in Union, Lincoln, Vernon and Beauregard parishes, and delivered lectures at the Short Courses which were held at these schools.

PARISH FAIRS.

The Assistant Director was also called upon to act as judge of agricultural exhibits at three of the Parish Fairs which were held in the fall.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

This society, one of the oldest agricultural organizations in the state, continued to hold its monthly meetings on the station grounds, and many important subjects were discussed by prominent agricultural authorities during the year. The Experiment Station officials took an active interest in these meetings and were ready at all times to conduct visitors over the station and explain the work to them.

NORTH LOUISIANA CAMP MEETING FAIR.

This fair, under the auspices of the North Louisiana Agricultural Society, was again held on the Experiment Station grounds, September 24, 25 and 26. A nice list of premiums was supplied by the enterprising farmers, merchants, bankers, and other business men of this section, and a most creditable fair was held. It is strictly an agricultural fair in every sense of the word. No entrance fees are charged and no horse racing, gambling, etc., are allowed.

Labor was not plentiful in the vicinity of the station during the year and our work suffered to some extent on that account.

Bulletin 141, containing 28 pages, on "Vegetable Culture in North Louisiana," was written by E. J. Watson and published during the year.

RICE EXPERIMENT STATION, CROWLEY.

F. C. Quereau, Assistant Director.

All experiments inaugurated in 1910 were continued in 1913. This is the fourth year that data have been gathered on these experiments.

In order to learn something of the fertilizer requirements of the rice soils, a series of plots are devoted to different amounts of phosphate; a series to potash alone; a series to potash and phosphate mixed in different quantities; a series to cottonseed meal and potash; a series to cottonseed meal and phosphate; and a series to all three mixed. The maximum application of the complete fertilizer is 1,500 pounds per acre. There are numerous check plots on these experiments. There are plots devoted to the use of stable manure, both with and without commercial fertilizer. This gives a vegetable matter check on the plots on which only chemical fertilizers are used. There are eight plots used to test the cheapest source of phosphate for rice soils. In this experiment, Thomas slag meal, 16% acid phosphate, and raw rock phosphate are used. The raw rock is used with and without stable manure. All plots of this experiment receive 50 pounds muriate of potash.

Another purpose of these fertilizer experiments is to determine the effect of commercial fertilizers when used continuously on the same land without the addition of vegetable matter in the form of manure or turned under green crops. It is a known fact that the use of chemical fertilizer will increase the yield of rice; it is as well established that the continued use of commercial fertilizer without vegetable matter will in the end result in much harm. In other words, more fertilizer must be used each year to maintain constant or increased yields; therefore, a time will come when the cost of the fertilizer will render its use prohibitive. Moreover, lands thus overworked by the use of chemical stimulants will be very difficult to bring back to their former state of productivity. As the average rice farmer, without thought of the future, is prone to overwork his land, it is reasonable to believe that he will use commercial fertilizer and will not ask the reason why until the matter is brought to his attention by decreased profits. Therefore, the Rice Station by having a series of plots on which the various combinations of commercial fertilizers are used, together with check plots, and plots on which vegetable matter, both in combination with commercial fertilizer and without, will accumulate reliable data showing the effects of these fertilizers on the rice soils. This should be of value to the more conservative of the rice farmers who may desire data that will enable them to adopt better methods in the future with reference to building up their farms.

The results of the past four years have shown that 16% acid phosphate has resulted in a heavier yield of rice at a smaller cost than any other element or mixture. The best and most profitable yields have come from the use of phosphate, potash, and manure. The potash when applied alone to the land has been used at a loss with the exception of the first year, when the first and only profitable yield of rice was made. This would indicate that the salts of kainit are of some value the first year on old and badly worn land. As we have no rice mill it has, of course, been impossible to test the milling quality of the rice, so we do not know how fertilizer may affect the milling.

It has been observed that water crab grass and other weeds grow with remarkable vigor where acid phosphate has been applied. In using acid phosphate, therefore, it is necessary to apply the irrigation water in such a way that the weeds and grass are destroyed.

One of the most important demonstrations in connection with our work is to obtain a successful crop rotation on rice land. Rice will likely always be the best money crop for the rice belt, but as it is impossible to grow the same crop on the same land year after year, it is necessary to find some crop or crops that will be profitable to grow on the land when it is not planted to rice.

In 1910, four crop rotations were established with this end in view.

1. A two-year rotation of corn and cow peas one year, and rice the next without a winter cover crop. The land is fallowed in the winter and all possible vegetable matter is turned under.

2. A two-year rotation similar to the first, except a winter crop is grown. Oats are generally used for this purpose.

3. A three-year rotation of rice, followed by corn and cow peas, followed by cow peas alone, the vines of same being turned under in the fall and followed by rice the third year. Winter cover crops of oats are planted.

4. A four-year rotation of rice two years and grass and lespedeza two years. The grass and lespedeza is pastured or mowed to keep down the red rice. The land is plowed in the fall.

The object of these rotations is to increase the yield of rice, eliminate the red rice by cultural methods, and to produce a crop that will be profitable from the standpoint of feed production.

The land of the station was in the beginning as badly infested with red rice as it is possible for land to be. The land is naturally very poor for the rice belt. The top soil is not over two inches deep.

The same amount of commercial fertilizer is used on all of the rotation plots with the exception of the check plots.

In these experiments, the average yield of rice has been increased from seven and one-half barrels to an average of fifteen barrels per acre. The corn yield has increased from nothing in 1910 to 32 bushels in 1913.

On the three-year rotation and the two-year rotation with the winter cover crop of oats, the red rice has been reduced by cultural methods to a point where seed rice can be raised. On the four-year rotation, and the two-year rotation without winter cover crop, the red rice in the land has not been reduced to any appreciable extent.

The cow pea crops have been uniformly good. Cow peas on rice land must be cultivated. They will not thrive when planted broadcast.

The yield of oats has averaged about 30 bushels per acre. This seems to be one of the best winter crops that can be found for rice lands.

A good crop of sugar cane was grown in 1913. Sugar cane may be grown for syrup making with profit on fairly well drained rice land. It is advisable, however, to turn under at least one crop of cow pea vines before planting the first crop of cane.

The U. S. Bureau of Plant Industry in co-operation with us planted about one-sixth of the farm in soy beans of different varieties. The soy bean makes almost as heavy a crop as cow peas, and on land that contains much red rice, it has the advantage of being a clean cultivated crop, which means that the red rice can be prevented from producing seed by team cultivation.

In 1913, cotton, kaffir corn, millet, highland rice, sorghum, buckwheat, castor beans, German and pearl millet, peanuts, sweet potatoes, giant beggar weed, and three varieties of velvet beans were planted on the area devoted to miscellaneous plantings.

The cotton made a fair crop, but was affected by rains late in July, and by the boll weevil. The latter, however, did not come until very late in the season. The summer rains of the rice belt makes cotton a very uncertain crop.

The millets, sorghum and kaffir corn made a good crop of forage, but produced little if any seed, because of insects.

The castor beans made a heavy growth of stalk, but the yield in beans was light.

The so-called highland rice proved to be no better than the ordinary varieties of the section when grown under similar conditions.

The peanuts were destroyed by the excessive rains during the fall, as, also, were the sweet potatoes.

The velvet beans made a good growth, but no better than the cow peas. The growth of these beans is so slow that the weeds and grass have an excellent opportunity to get a good start. The early running vines prevent proper cultivation to keep the weeds in check.

The oat crop of 1913 was short, due to the cold, wet spring The average yield was 25 bushels per acre.

All of the rice on the station was planted in the regular eight-inch drill and was not cultivated. The excessive rains of the harvest season, and the root maggot reduced the average yield of rice to about 15 barrels per acre. The average yield last year was over 20 barrels per acre.

The data on the oil experiments is of no value this year. The grade of oil that was used was so heavy that it would not spread on the water properly, and so much of the rice was killed by the oil. The yields of rice mean little if anything. Examination of the rice while growing, however, indicated that crude oil will in a large measure prevent damage from root maggot. Care must be exercised that the oil is of a light grade, so that it will spread on the surface of the water in a thin film and not collect in "islands" and thus destroy the rice, as it did in our case last year. Rice will stand a large quantity of oil without injury if it spreads evenly.

The corn crop of 1913 was the best ever raised on the station. Mexican June corn planted the first week in July made a fair crop, but was injured by the heavy rains in the fall after it matured.

The *Co-operative work* with the Bureau of Plant Industry of the National Department has been continued. Mr. J. M. Jenkins has been in charge of this work under the direction of Mr. C. E. Chambliss. Very careful study is being given to the botanical characters of rices, and a very large number of varieties are being tested for their adaptability to the soil and climate of Southwest Louisiana. Head selections are being made from the best strains and several varieties will be distributed in the near future in small quantities so that planters may test their adaptability to field conditions throughout the rice-growing section. Much good should come from the work being done in these lines.

The *Bureau of Entomology* has continued investigations on the life history of insects injurious to growing rice. Mr. Webb, of the Bureau of Entomology, has been in charge of this work and faithful and efficient service has been rendered by him. Results of various investigations carried on by the Federal Department will be published in their own bulletins.

FINANCIAL STATEMENT.

HATCH AND ADAMS FUNDS.

Dr.	Hatch Fund.	Adams Fund.
To receipts from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1913, under Act of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By salaries	$ 8,280.36	$12,876.20
Labor	1,871.85	423.01
Publications	1,319.36	....
Postage and stationery	115.29	43.45
Freight and express	65.91	63.43
Heat, light, water and power	62.74	287.83
Chemicals	6.80	136.06
Seeds and sundries	651.31	112.90
Feeding stuffs	718.05	258.56
Library	8.63	103.98
Tools, implements and machinery	789.30	36.98
Furniture and fixtures	25.00	44.48
Scientific apparatus	....	426.87
Live stock	326.25	.....
Traveling expenses	23.65	164.17
Contingent expenses	120.00	.....
Building and repairs	615.50	22.08
Total	$15,000.00	$15,000.00

STATE FUND.

Receipts:		
Received from the State Treasurer	$22,000.00	
Miscellaneous sales	5,258.89	
Payment of accounts Fertilizer and Feed Stuffs	14 000.00	
Deficit, November 30, 1913	1,811.21	
		$43,070.10
Expenditures:		
Salaries	$ 8,991.81	
Labor	7,438.95	
Publications	365.15	
Postage and stationery	520.16	
Freight and express	523.54	
Heat, water and lights	401.31	
Chemicals	47.30	
Seeds and sundries	1,679.96	
Fertilizer	586.40	
Feed stuffs	744.96	
Library	25.35	
Tools, implements and machinery	1,840.39	
Furniture and fixtures	208.34	
Apparatus	99.76	
Live stock	195.00	
Traveling expenses	1,857.02	
Contingent expenses	2,588.30	
Building and repairs	5,441.50	
Deficit, December 1, 1912	9,514.90	
		$43,070.10

AUDUBON SUGAR EXPERIMENT STATION REPAIR FUND.

Receipts:		
Cash on hand December 1, 1912	$ 1,411.21	$ 1,411.21
Expenditures:		
Building and repairs	$ 1,137.70	
Cash on hand November 30, 1913	272.51	
		$ 1,411.21

FERTILIZER AND FEED STUFF FUND.

Receipts:		
Cash on hand December 1, 1912	$ 3,322.38	
Received from Commissioner of Agriculture	25,000.00	
Miscellaneous sales	14.00	
		$28,336.38
Expenditures:		
Salaries	$ 7,861.53	
Labor	713.05	
Publications	687.21	
Postage and stationery	577.15	
Freight and express	56.85	
Heat, water and lights	761.47	
Chemicals	745.91	
Seeds and sundries	275.87	
Furniture and fixtures	30.29	
Library	2.03	
Apparatus	64.84	
Traveling expenses	24.97	
Building and repairs	417.44	
Expenses of Experiment Station accounts (see statement of receipts under State Fund)	14,000.00	
Cash on hand November 30, 1913	2,117.77	
		$28,336.38

CHANGES IN EXPERIMENT STATION STAFF.

J. E. Halligan resigned as Chemist in Charge of the Fertilizer and Feed Stuffs Control Laboratory, and was succeeded by G. D. Cain.

Dr. F. V. Emerson was appointed to have charge of soil survey work.

Miss M. Flower resigned as Mailing Secretary and was succeeded by C. W. Davis.

W. M. Hall was appointed Assistant Chemist.

I. Levin was appointed Assistant Chemist.

G. G. Gremillion resigned as Farm Manager at Audubon Park and was succeded by C. J. Barrilliaux.

PUBLICATIONS ISSUED DURING 1913.

Twenty-fifth Annual Report.

Bulletin 140,, Preliminary Report on Winter Cauliflower.

Bulletin 141, Vegetable Culture in North Louisiana.

Bulletin 142, Diseases of the Tomato in Louisiana.

Report of Analyses of Commercial Fertilizers, Season 1912-1913.

Report of Analyses of Commercial Feed Stuffs, Season 1912-1913.

Dup

TWENTY-SEVENTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

---

FOR 1914

TO THE GOVERNOR

By W. R. DODSON, Director

BATON ROUGE
Ramires-Jones Printing Company
1915

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR LUTHER E. HALL, *President.*
T. JONES CROSS, *Vice-President, Board of Supervisors.*
E. O. BRUNER, *Commissioner of Agriculture and Immigration.*
THOS. D. BOYD, *President State University.*
W. R. DODSON, *Director Experiment Stations.*

MEMBERS.

HENRY GERAC, Lafayette;
JOHN J. HENDERSON, Lagan;
J. E. BULLARD, Belmont.
JOHN T. COLE, Monroe;
R. E. THOMPSON, Wilson;

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
A. P. KERR, M. S., Assistant Director, Baton Rouge.
J. B. GARRETT, B. S., Assistant Director and Entomologist, Calhoun.
F. C. QUEREAU, M. S., Assistant Director, Crowley.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Assistant Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
F. V. EMERSON, Ph. D., in Charge Soil Survey Work, Baton Rouge.
E. W. KERR, M. E., Mechanical Engineering, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
E. S. TUCKER, Associate Entomologist, Baton Rouge, La.
W. L. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
M. A. SCHNELLER, Ph. D., Chemist, Audubon Park, New Orleans.
E. J. WATSON, Horticulturist, Calhoun.
C. H. STAPLES, B. S., in Charge of Dairy Dept., cooperating with Dairy Div., Bureau of Animal Industry, Baton Rouge.
G. D. CAIN, B. S., Chemist in Charge of Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
J. M. JENNINGS, B. S., Assistant Chemist, Baton Rouge.
S. BYALL, B. S., Assistant Chemist, Baton Rouge.
I. SELECTER, B. S., Assistant Chemist, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
I. LEVIN, B. S., Assistant Chemist, Baton Rouge.
MISS JESSIE A. LEE, A. M., Scientific Assistant in Charge of Seed Laboratory, detailed by U. S. Dept. Agriculture, Baton Rouge.
T. H. JONES, B. S., Entomological Assistant, detailed by U. S. Dept. Agriculture, Baton Rouge.
MRS. E. STRONG, Secretary to the Director, Baton Rouge.
J. K. McHUGH, Clerk and Stenographer, Audubon Park, New Orleans.
R. P. SWIRE, B. A., Treasurer, Baton Rouge.
C. W. DAVIS, Mailing Secretary, Baton Rouge.
A. D. SUMMERS, Farm Manager, Baton Rouge.
C. J. BARRILLEAUX, Farm Manager, Audubon Park, New Orleans.
W. B. NETTLES, in Charge of Dairy.

LOUISIANA STATE UNIVERSITY,
AND
AGRICULTURAL AND MECHANICAL COLLEGE.
OFFICE OF EXPERIMENT STATIONS,
BATON ROUGE, LA., January 15, 1915.

To His Excellency, Luther E. Hall,
Governor of Louisiana:

SIR—In compliance with the provisions of acts of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 2, 1906, known as the Adams Act, providing for Federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1914, and a financial statement for the government fiscal year, July 1, 1913, to July 1, 1914.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of Federal funds, so as to show the total receipts and expenditures for twelve months. The accounts have been examined and approved quarterly by the Supervisor of Public Accounts.

All required reports to the United States Department of Agriculture have been made. All have been approved by the proper authorities of the Federal Government. Annually the Office of Experiment Stations sends an inspector to examine the vouchers and account books of the Federal funds and to discuss with the several members of the staff the work being done in the laboratories and in the field. The Comptroller of Currency would withhold the Federal funds of subsequent appropriations unless the accounts and vouchers were satisfactory, or unless the work had made reasonably good progress. Our lines of work and the expenditure therefor have been promptly approved. The State Supervisor of Public Accounts examines quarterly the accounts of all money received and disbursed by the Experiment Stations. Our accounts have been regularly approved by him.

The general work of the Experiment Stations has progressed satisfactorily during the year. There have been no very important changes in our staff. All lines of investigations have progressed without interruption.

An act of the Federal Congress known as the Smith-Lever bill, providing for agricultural extension work in the various states of the Union, has made it necessary to definitely formulate plans for the development of broad activities in the line of agricultural extension and for correlating lines of investigation, demonstration and extension teaching generally, so as to secure the greatest efficiency in all lines of work. The president of the University and the director of the Experiment Station, after a full discussion with representatives of the United States Department of Agriculture, entered into an agreement by which all future agricultural extension work in Louisiana will be carried on in cooperation with the Louisiana State University, and the dean of the college was appointed as director of extension for Louisiana. This action has been ratified by the Board of Supervisors of the University, and by the Secretary of Agriculture.

In accordance with this agreement, the Farmers' Cooperative Demonstration Work was articulated to the University, as a division of adult extension work.

During the last session of Congress a special appropriation of sixty thousand dollars was made for live stock investigations and demonstrations in the cane sugar and cotton sections of the United States. This money became available on the first of July, 1914. Its administration was entrusted to a committee consisting of the Chief of the Bureau of Plant Industry, Chief of the Dairy Division of the Bureau of Animal Industry, and the Director of the Experiment Station of the Louisiana State University. This committee after very thorough consideration decided to divide this work into two divisions. First, live stock investigations, to be conducted on a farm basis that would permit of commercial tests being carried out in live stock production and feeding; and, second, instructional work designated as live stock extension. The State of Louisiana in offering its cooperation for the expenditure of this money, passed an act in 1914 authorizing the Governor and the Board of Control of the State Penitentiary to offer for farm demonstrations 500 acres from one of the State penal farms. The Chief of the Dairy Division of the Bureau of Animal Industry and the Director of the Experiment Station of the Louisiana State University looked over the available land on Hope Plantation, Iberia Parish, and Oakley Plantation, Iberville Parish, and recommended the acceptance of 500 acres of cultivable land of Hope Plantation, about four miles from Jeanerette and six miles from New Iberia on the Bayou Teche. The Federal authorities approved of this recommendation, and the Governor and the Board of Control had a deed made to the Federal Government for this tract of land, to be held as long as it might be devoted to experimental and demonstrational work. The citizens of New Iberia and Jeanerette, and the Police Jury of Iberia Parish have provided for the construction of a bridge across the Bayou Teche, so as to make the farm readily accessible from the model road (which traverses the west bank of the bayou), the interurban trolley line (which runs parallel to the model road), and the stations of the Frisco and Southern Pacific railroads. Each of these railroads has agreed to do everything possible for furthering the work on this farm and to make it accessible to the traveling public. One will be able to leave trains on either of these roads within a few hundred yards of the farm. Mr. Sandigger, owner of the property on the west bank of the Teche, opposite this farm, has agreed to donate a right of way for a road to the bridge, and a sufficient strip of land for a residence property for the superintendent on the west bank, extending from the bayou to the model road. The people of the community are greatly interested in the enterprise and are lending every assistance that could be asked to make the work a success. Plans were perfected for inaugurating the work on various lines of live stock production and feeding, and fields, roads and buildings have been planned and the work is now fully inaugurated. Dr. C. E. Mauldin has been put in charge of the farm and has been provided with sufficient field and office force to carry out this work effectively.

The live stock extension work has been organized with Dr. G. E. Nesom as superintendent, with the following corps of specialists to assist him:

W. R. Dodson	Director.
G. E. Nesom	Superintendent.
W. R. Perkins	Grain and Forage Crops.
A. F. Rolf	Poultry Husbandry.
R. W. Kiser	Beef Cattle.
C. H. Staples	Dairying.
A. R. Moist	Swine Husbandry.
E. H. English	Secretary.

A specialist in horses and mules and hog cholera will be added to the organization in the near future. The University has provided office room for Dr. Nesom and his force in one of the frame buildings on the University campus. It is planned that these specialists shall hold farmers' meetings all over the State for the purpose of discussing live stock problems, and visit parties launching live stock production enterprises, to consult with them regarding plans of operation in breeding, etc. They are to make special effort to help the parish agents of the Farmers' Cooperative Demonstration Work, and to render every assistance and service possible as consulting experts in their respective lines of endeavor.

During the early part of the summer we secured from the Bureau of Animal Industry a hog cholera specialist to engage in extension work under a cooperative agreement. This work progressed very satisfactorily until the veterinarian in charge of the work was taken over by the Live Stock Sanitary Board for service in the production of hog cholera serum. The outbreak of the foot and mouth disease calling for the services of the full force of the Bureau of Animal Industry, has made it impossible to resume this work up to the present time.

SHORT COURSES AND AGRICULTURAL FAIRS.

The members of the station staff have offered freely their services in a considerable number of farmers' short courses held in different parts of the State, and at the various parish fairs, and the State Fair. They have acted as judges of live stock and agricultural products, and have given a helping hand at every place where they could serve in promoting the welfare of the community or the State.

L. S. U. EXPERIMENT STATION DAIRY.

During the summer a dairy barn, costing $1800, was constructed on a farm of the University southeast of Baton Rouge, and the dairy cattle were removed from the University campus to this farm. The construction of the building was paid for by the University in the expenditure of a portion of the special appropriation from the last legislature. The dairy is used now more largely for teaching purposes, and the Experiment Station is no longer spending money for its maintenance. Except for the construction of the building, the dairy has for some time been self-sustaining and at the same time the herd has been increasing in number and in value. With the new equipment the score given by the Louisiana State Board of Health is considerably higher than that of any other dairy in the State, being a fraction over 98%.

The stations have written during the year 12,456 personal letters, and sent out 40,306 bulletins, 11,388 circulars, and 2,901 postal cards. While many of these have pertained directly to experimental work, the majority of them have been in the nature of disseminating information secured from experiments carried on at the stations, and may be properly classed as extension work. A considerable portion of the correspondence has been shifted to the extension faculty, and as the extension becomes more completely organized it will absorb much of the large correspondence now carried on by the Experiment Station staff.

FERTILIZER LABORATORY.

The work in the laboratory for the analysis of feedstuffs and fertilizers for the State Board of Agriculture has been about the same as usual. There have been a few instances of striking violations of the law in the sale of fraudulent fertilizers and feedstuffs, all of which have been properly reported. We have not been called upon, however, to give any testimony in court in any of these cases, and the presumption is that there have been no prosecutions.

At the solicitation of members of the legislature, the Director of the Experiment Stations assisted in the framing of bills that were presented to the legislature at the regular session of 1914, suggesting rather marked changes in the present laws. The bills as framed provided for placing the inspection and analysis of fertilizers and feedstuffs entirely in the hands of the State Board of Agriculture, requiring that the official samplers be trained agriculturists, and providing for the samples to be taken after the fertilizer left the factory, rather than at the factory, as at present prescribed. An even more important change suggested was that the official representative of the State Board of Agriculture should institute proceedings against violators of the law, instead of leaving it to the individual farmers who might be sufferers from such violations. These bills were copied largely after recommendations by the Association of Fertilizer and Feedstuff Control Officials of the United States, with additions copied after the law of Texas, which is said to be excellent. These bills failed, however, to pass and the work remains as it has been for many years.

It would be very desirable to have the Station entirely released from work pertaining to police or regulatory powers.

SHREVEPORT STATE FAIR.

The Experiment Stations, as usual, made a joint exhibit with the University at the State Fair. The exhibit consisted of charts, photographs, specimens and models depicting, as far as practicable, the more important lines of investigation carried on by the stations. A considerable portion of the equipment of the Government Seed Laboratory was sent to Shreveport and operated there during the period of the Fair.

DEPARTMENT OF SOILS.

The Experiment Station pays half of the salary of Dr. F. V. Emerson, geologist, who is doing preliminary work for a detailed soil survey of the State. The work is of such nature that there can be but little to report at the present time, except that the work is progressing, and no doubt Dr. Emerson will ultimately accumulate data of great importance to the agricultural development of the State. Especial attention will be given, during the coming year, to the lime and phosphorus requirements of the different types of Louisiana soils.

BATON ROUGE STATION.

A. P. KERR, Assistant Director.

The work of the station this year has been a continuation of experiments previously planned, which must be continued for a period of several years in order to secure accurate data, and a few new experiments planned at the beginning of the year.

The experiments previously inaugurated—rotation of crops to conserve the fertility of the soil, fertilizer tests to determine the value of nitrogen and phosphorus in different forms for various crops, variety tests of corn, spacing of corn, tests of the value of removing suckers from corn, the value of seed selection, variety tests of clovers with and without lime and green manure, yields of dasheens under local conditions, and crops for hogs—have been continued with satisfactory results.

The station has coöperated with the United States Department of Agriculture in growing different crops to ascertain their adaptability to this climate. These crops consisted of Sudan grass, foreign varieties of soy beans, catjang peas, adzuka beans and different strains of velvet beans. Most of these crops will be grown next year from seed produced here.

The grazing experiments with hogs consisted of rotation of crops as follows: corn and cow peas, soy beans and sweet potatoes. The grazing period lasted about seventy-five days. The hogs were then fed a ration of corn and cottonseed meal for twelve days and marketed. After being slaughtered, fifty-seven of a lot of sixty were considered good packing house hogs.

Because of the increased interest among the farmers of the State in silage as cattle feed, an experiment with different crops for silage was begun this year, consisting of Japanese cane, a mixture of corn and sorghum, and corn and soy beans. These crops were put in a stave silo during the summer and the silage is being fed as a part of a ration of thirty steers. Twenty of these steers are grade Herefords purchased at Fort Worth, Texas, the remaining ten are commonly known as "scrubs" purchased in East Baton Rouge Parish. The gains made by these two classes of steers as feeders will be noted, as well as the feeding value of the silage. These steers will be marketed in the spring at the close of the feeding period.

Experiments to ascertain the value of raw phosphate rock, lime and acid phosphate on the yield of lespedeza were also commenced this year and will be continued for several years.

The station purchased a fine Hereford bull last March from the W. J. Davis Company of Jackson, Miss. This bull will be used as the head of the station herd, and is considered a very valuable addition to the live stock of the station.

VETERINARY DEPARTMENT.

W. H. Dalrymple, Veterinarian.

Harry Morris, Assistant Veterinarian and Bacteriologist.

During the scholastic year of the University a considerable part of the time of the Veterinarian has been occupied with class work in the College of Agriculture. In addition to this, however, he has been able to attend to some extension work throughout the year; and he has responded to numerous calls over the State to afford information concerning the work of tick eradication, and on one occasion, during the summer of 1914, spending an entire week on an itinerary including thirteen parishes. As an ex-officio member of the State Live Stock Sanitary Board, he has devoted some time to that work, in an advisory way, and has attended all the meetings of the Board.

He has also attended and taken part in several immigration meetings held for the purpose of endeavoring to induce desirable foreign immigration to the State.

The Veterinarian, as a member of the Baton Rouge Chamber of Commerce, assisted in the successful inauguration of the Baton Rouge Live Stock and Agricultural Fair, and was largely instrumental in the establishment of the Baton Rouge monthly market for the farmers, a project which other sections of the State seem to be adopting.

He has also contributed numerous articles to the State, as well as some national, agricultural journals.

He was appointed reporter for the United States on anthrax or charbon to the tenth International Veterinary Congress, held in London, England, August, 1914, and submitted his report, which was reproduced in the various official languages of the Congress.

The correspondence of the department has been quite extensive, and has included, in addition to veterinary subjects, that pertaining to animal husbandry.

The purely research work of the department has been attended to by Dr. Harry Morris, Bacteriologist and Assistant Veterinarian.

DEPARTMENT OF ANIMAL PATHOLOGY.

Harry Morris, Bacteriologist and Assistant Veterinarian.

The work in the Department of Animal Pathology has been continued along the same lines as in previous years.

ANTHRAX.

A general study of this disease has been continued. Many points concerning its eradication and control have been further studied. Special attention was given to the horn fly as a possible carrier of the disease and some valuable data obtained regarding conditions under which transmission has been positively demonstrated. A popular bulletin on the subject of anthrax is being prepared for publication.

By the continued observance of strict sanitary rules and the use of vaccines, another year has passed without the loss of a single animal from anthrax on the station farms.

COTTON SEED MEAL POISONING.

With the Department of Plant Pathology, the study of the subject has been continued. A number of feeding experiments have been carried on testing the merits of several methods for reducing the toxicity of the meal. The work is still in progress and will be continued during the coming year.

HOG CHOLERA.

This project has been added to our list of diseases during the past year. A special study is being made concerning the spread of infection by some of the common carriers of the disease.

During the past year we have had the usual work of a bacteriological laboratory. On account of the outbreak of anthrax during the past summer we examined an unusually large number of blood smears and answered many inquiries concerning the disease and its control.

DEPARTMENT OF PLANT PATHOLOGY.

C. W. Edgerton, Plant Pathologist.
C. C. Moreland, Assistant Plant Pathologist.

The work in the Department of Plant Pathology has continued along the same lines as in previous years. A careful study is being made of several of the most important diseases of the State. The troubles that have been under investigation during 1914 include the following:

BEAN DISEASES.

The two important bean diseases have been under investigation for a number of years and several articles have been published on them. During the past year the work has been confined entirely to the anthracnose disease. A study is being made of the various strains or races of the fungus causing the disease, and also the effect of temperature on the growth of the fungus. These phases of the problem will receive further attention during the coming year.

COTTON BOLL ROTS.

The studies on the cotton anthracnose disease have been continued, but an unfavorable season interfered with the work considerably. Some data, however, was obtained on varietal resistance and the effect of temperature on the disease.

SUGAR CANE DISEASES.

The various sugar cane diseases have received attention during the year. Experiments on the effect of the Red Rot Disease on germination of cane at Audubon Park gave some very interesting data. These experiments will have to be continued through a series of years, however, to give reliable results.

TOMATO DISEASES.

Much time has been spent on the Wilt and Early Blight diseases of the tomato. The wilt-resistant strain which had been selected in earlier years was distributed to growers throughout the country and a thorough test was made of it. The strain gave excellent results in some localities, while in others it did not seem to be superior to other varieties. Whether this variability was due to different strains of the fungus or to different soil conditions has not been determined. At present, a study is being made of a number of different strains of the fungus from different sections of the state and country. A number of different hybrids between the Wilt-Resistant strain and the Earliana have also been studied and selections made.

EGG-PLANT DISEASE.

The study of the Egg-plant Blight caused by *Phyllosticta hortorum* has been continued. New data regarding the life history of the fungus and its method of dissemination have been obtained. It is possible that a bulletin on this disease will be issued during the coming year.

THE ANTHRACNOSE PROBLEM.

In connection with the work on the bean and cotton anthracnoses, a general study of the whole anthracnose group of fungi has been made. New data have been obtained on the temperature requirements of the different forms and also upon the methods of reproduction.

OTHER WORK.

Besides the diseases mentioned above, attention has been paid to the Sclerotium Wilt Disease, the Damping Off Disease, the Cotton Wilt and the Citrus Canker. Also the Cotton-seed Meal Poisoning Project has been in cooperation with the Department of Animal Pathology.

During the year, the Pathologist attended the meetings of the Southern Agricultural Workers at Clemson College, South Carolina, in October, and the meetings of the American Association for the Advancement of Science at Philadelphia in December. Papers were presented at both of the meetings. He also made a trip through Florida in December, looking into the Citrus Canker situation.

During the year the correspondence of this department consisted of between 900 and 1000 letters.

PUBLICATIONS DURING 1914.

Citrus Canker. La. Bulletin No. 150.

Plus and Minus Strains in the Genus Glomerella. Amer. Jour. Botany, 1: 244-254. 1914.

A Method of Picking Up Single Spores. Phytopathology, 4: 115-117. 1914.

Alfalfa Growing in Louisiana. Modern Farming. December.

Results in Plant Breeding at the Various Experiment Stations. Southern Farm and Dairy.

Wilt Resistance Tomatoes. Rural New Yorker.

The Onion Mildew. Southern Farmer.

The Septoria Leaf Blight of Tomatoes. Southern Farmer.

The Citrus Canker Situation. The Southern Farmer. November.

ENGINEERING DEPARTMENT.

E. W. Kerr, Mechanical Engineer.

INVESTIGATIONS IN SUGAR ENGINEERING.

During the past year this department has pursued two lines of investigation, viz: (1) a continuation of the experiments on heating and evaporating apparatus and (2) the efficiency of different types of bagasse furnaces and settings.

Early in the year about six weeks were spent at Guanica Central, in Porto Rico, making capacity and economy tests on the heating and evaporating machinery, this work being made possible by the cooperation of the officials of this company both as regards expense and assistance. The data obtained in this series of tests are of especial value, in that they make possible comparisons of the efficiencies obtained in good Louisiana and tropical plants.

During the summer, Bulletin No. 149, entitled Performance Tests of Sugar House Heating and Evaporating Apparatus, was prepared and published. This bulletin contains 178 pages and 66 illustrations and gives the results of investigations extending over some three years' time and covering the capacity and economy of heating and evaporating apparatus, including multiple effects, vacuum pans, condensers and juice heaters.

The matter for another bulletin that will contain steam and heat balances made up from tests at two typical factories, one in Louisiana and one in the tropics, has been prepared and will soon be ready for publication. By means of the data given in this bulletin the steam consumption and fuel cost are shown for each of the steps in the process of the manufacture of sugar.

During the grinding season just past a series of boiler tests was made on each of three typical bagasse boiler plants, the object being to determine the effects of the form and dimensions of the furnace and setting upon fuel economy.

A paper entitled Fuel Economy in Sugar Factories was read before the Louisiana Sugar Planters' Association in June.

Numerous articles on subjects pertaining to sugar engineering have been written for sugar journals, including the Louisiana Planter, Sugar, and El Mundo Azucarero.

An exhibit of the work of the department was made at the Baton Rouge and Shreveport fairs.

DEPARTMENT OF HORTICULTURE.

George L. Tiebout, Horticulturist.

Investigation and demonstration in the production and marketing of truck crops have been continued. Winter cauliflower, Brussels sprouts and bell peppers have received special attention in a commercial way.

WINTER CAULIFLOWER.

The interest shown, especially in the alluvial section, in winter cauliflower has warranted extensive investigations with this crop. Louisiana cauliflower is now being shipped for the first time in carload lots. Prospects are good for a large increase in acreage among growers next year. Our experiments with varieties imported from Denmark show that the earliest snowball is the most desirable for the market. The trade pronounces Louisiana cauliflower far superior in quality to those of competitors. The crop is at present produced from trade seed, imported from Denmark by the Louisiana Cauliflower Association, Baton Rouge. However, under arrangement made during a visit of an expert cauliflower seed grower from Denmark, our growers may obtain a far superior grade known as ''stock seed,'' grown to order. This arrangement should make our ''best'' better.

Our method of planting cauliflower seed in the field in hills and thinning to a stand is well adapted to the heavier soils of Louisiana. It is practically the only system used by growers.

The Louisiana cauliflower crate designed to hold six heads has been found a little small to suit the demands of the trade. We have adopted the half standard crate, holding ten to twelve heads, for extensive shipments.

The transportation of small shipments of cauliflower to distant markets by refrigerator freight has received special attention. Under arrangement with a general consignee at New Orleans we ship cauliflower there to be loaded in refrigerator cars with other vegetables for New York and Chicago, thus effecting an enormous saving over express rates. This service will allow a grower with a modest acreage within a hundred miles of New Orleans a fair return for his efforts, which, perhaps, will be the nucleus of sufficient acreage for carlot movement in the future.

BRUSSELS SPROUTS.

Our investigation with Brussels sprouts to date have been largely confined to culture and varieties. The several varieties imported from Denmark are worthless. They make a rank growth and loose sprouts. Fairly good results have been gotten from the Long Island dwarf from seed grown on Long Island, N. Y. We will make a few shipments this year. While the demand for Brussels sprouts is somewhat limited, it appears that modest efforts should be remunerative.

BELL PEPPERS.

With the demand for bell peppers increasing and the larger markets receiving car lots, it appears that the Louisiana product will have to move to distributing centers in refrigerator cars instead of by local express, as formerly. Upon receipt of complaints of our peppers arriving in bad condition by express, we loaded several hundred crates in refrigerator cars and had them arrive in perfect condition by freight.

Since the first of July an arrangement was made for the writer to devote half of his time in truck extension work.

The correspondence of the department has been largely confined to truck crops, mostly cauliflower. The writer judged the vegetables at the State Fair as usual, also at the South Louisiana Fair. He also assisted in installing and caring for the exhibit of the station at the State Fair, has served as secretary-treasurer of the Louisiana State Horticultural Society, and acted as adviser of the Louisiana Cauliflower Association.

DEPARTMENT OF ENTOMOLOGY.

E. S. TUCKER, Associate Entomologist.

A great increase in the work devolving upon the department of entomology was marked during the year 1914. Early in the spring, an investigational study of the southern corn root-worm was undertaken, but it soon had to be discontinued on account of other duties. Correspondence regarding insect and other crop pests, and treatment for them, was exceptionally heavy. Matters relating to inspection also required much office labor, which is yet in need of clerical help.

In co-operation, the Bureau of Entomology, U. S. Department of Agriculture, has delegated Mr. Thos. H. Jones for study of truck crop insects. He entered upon his work in October, making his headquarters at this Station.

Most of the entomologist's time was devoted to horticultural inspection affairs, in compliance with Act 36 of 1910, which law places the power of its enforcement upon the State Board of Agriculture and Immigration. An emergency having arisen, due to the introduction into the State of a new and dangerous plant disease called citrus canker, a regulation prohibiting further entry of citrus stock, except under certain stipulations, was promulgated and made effective on October 2. Charges for two violations were carried to court.

As no specified funds have been provided by the State for carrying out the provisions of the Act, the entomologist was only able to meet the situations demanding his attention, in the same manner as had been followed in previous years, or just so far as his time could be taken from the Experiment Stations, which paid his salary, and under certain allowances granted by the Commissioner of Agriculture and Immigration for expenses. Though the allowances were proportionately increased for exigencies in 1913, and again in 1914, yet a sum needed for general eradication work was beyond available means. Besides, the entomologist was primarily obliged to attend to regular inspection of nursery stocks and plants for sale, in order that certification could be issued for the growers to do business. Even with the best efforts, some inspections were delayed because of the fact that the entomologist had to visit the places in person, having no assistance except for the last two weeks of the year. Altogether, 120 certificates have been granted.

To meet the danger caused by the citrus canker, a meeting of orange growers was held in New Orleans on September 19, when several hundred dollars were raised by private subscriptions, and Mr. H. A. Lastrapes was engaged thereby as special inspector to seek out and destroy all canker-infected growth. Authority to operate under the State law was conferred upon the special inspector, and very satisfactory results in discovering and eradicating the disease were obtained by him in Plaquemines parish and places near New Orleans. All infected growth found by him was burned, and he also exercised careful watch to guard against spread of the disease in exposed groves.

A number of infections in other parts of the State were brought to notice voluntarily by persons who willingly took prompt action, or agreed to do so, for burning the diseased trees. While a campaign for raising money to carry on special inspection work in every citrus-growing parish was urged, the responses have not been sufficient to guarantee the undertaking. Therefore, we cannot deny that citrus canker still exists in the state.

A difficulty was experienced with the Texas nursery inspection official, who, for a time, refused to allow any kind of stock to be shipped into his state from our nurseries. Relations, however, were finally adjusted on terms agreeable to all concerned. Importations of foreign plants have run well up in number, being much more than was expected, but inspections of them could not always be made promptly.

The cottony cushion scale has persisted in some places and was further found infesting ornamental plants and shade trees on an entire city block in a choice residential section of New Orleans. The occurrence of many other crop pests of a decidedly injurious nature could also be mentioned. Conditions show, however, that the horticultural interests of Louisiana have reached a point where one man having all the state entomological work to look after alone cannot cover the field properly, nor render adequate service without sufficient funds.

In addition to short articles furnished to agricultural papers, the entomologist has prepared information that was published by the Experiment Stations, as follows:

Bulletin No. 145—Suppression of the cottony cushion scale in Louisiana.

Crop Pest Notice No. 1—Notice relating to citrus canker. List of Louisiana dealers in nursery and ornamental plants.

Crop Pest Notice No. 2—Phylloxera galls affecting pecan trees.

SUGAR EXPERIMENT STATION

Audubon Park, New Orleans.

W. G. Taggart, Assistant Director.

At the Sugar Experiment Station all field experiments were continued as previously outlined. Some additions thereto consisted in a study of the proper time at which fertilizers should be applied to corn, the use of clover as a winter and early spring crop on fall plant cane, and the use of green manures with raw rock phosphate as a fertilizer for sugar cane.

Unfavorable weather during the growing season greatly affected all fertilizer experiments; especially was this true of sugar cane. Some of the phosphate experiments yielded results in accordance with data previously obtained. Data from nitrogenous fertilizers were not constant. Results from clover with an ordinary cane fertilizer are very promising. It is intended to continue all of the above experiments next year.

Unusually heavy yields of clover were obtained. One plat of red clover gave four tons of hay per acre from the first cutting and about six tons for the year. Other hay crops yielded well. Five cuttings of alfalfa gave 12,536 pounds of hay, the last two cuttings being light and somewhat mixed with crab grass.

Seven varieties of corn were tried out. Three of the varieties, while showing signs of good seed selection, were found not to be suitable for our conditions on account of the ear growing too close to the ground. Of the other four, the variety known as Yellow Creole gave the best results. On account of this corn being so well adapted to South Louisiana conditions, we have undertaken to make it a prolific variety by seed selection. The breeding of a white flint corn was continued. Other corn experiments carried out were an experiment with borax treated manure for the Bureau of Entomology, and a test on a small scale of a commercial product—"B. D. R." (radium tailings)—for one of the fertilizer manufacturers.

Five new foreign varieties of sugar cane from Danish West Indies were received and are growing. Four varieties were received from Mauritius, of which one grew. But on account of a quarantine regulation, which was put into effect by the Federal Board of Horticulture, we will not be able to bring in more new foreign varieties of sugar cane. This regulation probably retards us in that work, but it will not be a serious handicap, as arrangements have been made by which this board will bring in any variety we desire, and keep it in Washington under observation for one year. This will lessen the chance of and relieve us of the responsibility of introducing any dangerous pest, either insect or plant disease.

Cane seed were received from Director H. P. Agee of the Hawaiian Station and from Prof. J. T. Crawley of the Porto Rico Experiment Station. About fifteen hundred seedlings were germinated from them, and we have in the regular plats four hundred and ten new varieties. L511 continues its record of yielding a juice of the highest sucrose content. A yield of twenty-two tons per acre was secured from this cane, and, while this is not as heavy a tonnage as is secured from D74, the high sucrose content of L511 makes it an attractive cane.

Five of the most promising of the Louisiana-grown seedling canes were distributed throughout the State. The supply of these canes was limited and we regret that we could not meet all of the heavy demands for them made on us by the sugar planters.

In the Department of Bacteriology, the investigation of the comparative value of various culture media for the quantitative determination of the microorganisms in sugar house products, which was begun in 1912, was completed in the early part of the past year, and the results published in Bulletin 146 of this station.

The investigation of the relative value of various germicides for use in sugar factories was begun during the grinding season of 1913 and has just been completed. The results are now in manuscript form ready for publication as a station bulletin.

During the past year the investigation of sugar deterioration has gone steadily forward. Numerous experiments have been conducted on the storage qualities of various types of sugars, the relative rate of deterioration caused by different species of microorganisms, and the factors that tend to influence the keeping quality of sugars. About fifty samples of sugar have been collected from various plantations in the State, and also from Cuba and Porto Rico. These samples are to be used in experiments in the grading of sugars. Among these samples are many choice plantation whites, yellow clarified, and 96-test sugars.

Preliminary investigations of the bacterial flora of borer holes in cane resulted in the isolation of a species which possessed a marked ability to ferment sucrose. Although not completely identified, this species is probably *Bac. Fitzianus,* as it has the power of fermenting glycerine. Experiments in which a culture of this species was used to inoculate cane gave negative results. The experiments are to be repeated this year.

During the grinding season an investigation was conducted on the characteristic fermentation of cane juices at various temperatures. It was found, from observation on about twenty-five different samples of juice, that at a temperature of between 10° C. and 16° C. the natural fermentation resulted in a greater viscosity than at higher temperatures. Juices kept for a week in the box were always more viscous than those kept for the same length of time in an incubator at 34° C. The ice box stored juices were more viscous than the room temperature juices, except in cold weather, when the temperature of the room more nearly approximated the limit of 10-16° C than the ice box.

The work of the Chemical Department was interrupted by the loss of Dr. W. E. Cross, who resigned to accept a position elsewhere. That department completed and published a bulletin on the Clarification of Louisiana Cane Juices. A further study of clarification and the possible by-products of the sugar industry was entered into. This work will be taken up and carried out by Dr. Max A. Schneller.

The Bureau of Entomology continues its operations with us, through Mr. T. E. Holloway and two assistants. Their work in combatting the cane-borer with parasites has given hopeful results. Two trips by them to Arizona and South Texas, in search of other parasites, proved unsuccessful. Further efforts will be put forward in this line, and one man will be sent by the Bureau to the tropics within the near future. Study of the mealy-bug and the relation of the Argentine ant to the mealy-bug was continued.

Three meetings of the Louisiana Sugar Planters' Association were held on these grounds, at which members of the staff contributed papers for discussion.

The last legislature made extra appropriation for the improvement of the sugar house. One thousand dollars of this was made available and was used to great advantage. The necessity of experimenting with methods for the manufacture of white sugar has made it compulsory for us to make some changes in the plant, and by the use of the remainder of this money we will be in a position to undertake work that heretofore has been almost impossible.

The station office mailed 1198 letters on station business and answers to inquiries; 693 bulletins; 22 books; 1525 postal cards, and 79 packages of miscellaneous samples and specimens.

NORTH LOUISIANA EXPERIMENT STATION

Calhoun, La.

J. B. Garrett, Assistant Director.

Practically all of the experiments in progress in 1913 were continued, some were enlarged and other new work was inaugurated.

The work here has included several rotation experiments, soil improvement work, tests with varieties of cotton, corn, cow peas, peanuts, soy beans, sweet and Irish potatoes, sorghum, millets, and velvet beans; fertilizer and cultural experiments with a number of these crops, silage production, pork production experiments and experiments with fruit, truck and vegetable crops.

Some of the most important work of this station has been the rotation experiments. The hill farms of this portion of the State are greatly in need of soil improvement and it has been for the purpose of getting data along this line that these experiments have been inaugurated.

The first experiment of this kind was started soon after the station was established and has been continued without interruption up to the present time. It is a three-year rotation in which corn and cow peas are followed by oats and peas, which are followed by cotton the third year. A home-made compost is also used in connection with the rotation. The results each year have been highly in favor of the fertilized portion of the experiment. A description of this experiment accompanied by the results for several years was published as Bulletin No. 111 of the Experiment Station.

Another three-year rotation experiment was begun in 1913 in which raw rock phosphate is being used in comparison with acid phosphate as a source of phosphorus. In this rotation corn and cowpeas are followed by crimson clover, which is removed for hay or seed, and this is followed by velvet beans. The valvet bean vines are turned under to supply nitrogen and decaying organic matter to render the raw rock phosphate available. On one-half of each plot raw rock phosphate is applied at the rate of 2700 pounds per acre and is turned under with the bean vines. The other half of the plot receives acid phosphate at the rate of 300 pounds per acre in the spring just before planting cotton, which follows the third year. In this way the land receives 2700 pounds per acre of raw rock phosphate every third year and the supply of nitrogen is kept up by the cow peas, crimson clover and velvet beans. The results the past year have been practically identical on the raw rock phosphate and acid phosphate plots. On the raw rock phosphate plot 1207 pounds per acre of seed cotton were produced and 27.9 bushels of corn, and on the acid phosphate plot 1228 pounds of seed cotton and 27.7 bushels of corn.

Another experiment along this line, which should give interesting and profitable results for this section of the State, was begun the past year. About thirty acres of land are included in this work. One-third of this area will be devoted to silage crops each year, one-third to corn for grain and one-third to cotton. Cow peas will be planted in the corn and crimson clover will follow the cotton in the fall and will be turned under the following spring for soil improvement. The silage will be fed to live stock and the manure returned to the soil. This will give two leguminous crops and an application of stable manure for one-third of the land each year for soil improvement and cotton and live stock for cash crops.

A creosoted pine stave silo was erected last August in one corner of this field and the silage is now being fed to native cows. A fine shorthorn bull has been purchased and will be used in grading up these native cattle.

A considerable portion of the station's land has been devoted to corn and cotton, the two principal crops of this section. In the various corn experiments about 687 bushels of corn were produced and about 55 tons of corn silage was put into the silo. About 11,740 pounds of seed cotton were produced in the cotton experiments.

In the corn variety tests it was again demonstrated that home-grown seed, when properly selected, is superior to seed brought from a distance.

Eighteen varieties of corn were represented in the variety test and the three which gave the highest yields came from seed grown in North Louisiana.

Twenty-nine varieties of cotton were represented in the variety test and the highest yielding variety came from seed grown here on the station. The same variety stood highest in 1913 and the seed was grown in North Louisiana.

Quite complete fertilizer experiments have been conducted with sweet potatoes and peanuts the past two years, but the results have been so variable that no conclusions have been drawn from them.

The sweet potato storage house was again filled last fall and another storage experiment is now in progress. The yield of potatoes was fine, especially with the early plantings, and the weather was ideal for harvesting. The potatoes were put into the house in splendid condition and are in a perfect state of preservation at the present time.

An interesting acreage has been devoted to fall-sown crops. Crimson clover and oats are the best adapted to conditions in this section and have been most largely used. About 17 acres have been seeded to crimson clover and 12 acres to oats.

Good yields of alfalfa were again secured on the plots on the red type of soil, but these experiments had been continued on this land for four years and the coco grass had become so abundant it was necessary to discontinue alfalfa. The land was planted to oats and will be planted to some clean cultivated crop this spring to control the coco. About an acre of land has been devoted to alfalfa experiments on the gray type of soil. Lime and stable manure were used in different proportions in a number of these experiments and the seed was planted broadcast and in drills. The alfalfa planted in drills will be cultivated to prevent injury by the growth of grasses and weeds. The results the past year again demonstrated the fact that it is necessary to inoculate alfalfa on this type of soil. Some of the early cuttings on the inoculated plots gave a yield of over a ton of hay per acre per cutting.

Sudan grass was again tested here. It was planted in drills three feet apart and was cut twice. The first cutting produced 2.45 tons per acre, and the second cutting gave 2.98 tons, or a total of 5.43 tons of hay per acre. It was planted on the red type of soil and it would have produced something like 30 bushels of corn under the same conditions. The seed crop was a failure. A great many articles have been written in the agricultural papers throughout the country about the grass and we have received many inquiries from farmers asking for information about its adaptability to this section.

In the variety test with cow peas some of the heaviest yields ever recorded here were secured. The New Era, Groit and Iron varieties produced 32.30, 26.35 and 20.96 bushels per acre, respectively. Two pickings were secured from each of these varieties. The Whippoorwill, which is the standard variety in this section, only produced 10.20 bushels per acre. Ordinarily, ten or twelve bushels of peas per acre is a good crop here. The other varieties in this test produced from four to eight bushels per acre.

On the general variety plot, where new introductions and miscellaneous varieties are tested, fifty-four varieties of sorghum, millets, soy beans, velvet beans, grasses, etc., were grown. Several of the sorghums were harvested and weighed at the proper time to ascertain the amount of silage each would make. The results were as follows:

Early orange sorghum	13.12 tons per acre
Feterita	11.37 tons per acre
Red kaffir corn	10.44 tons per acre
White milo maize	10.38 tons per acre
White kaffir corn	10.32 tons per acre
Dwarf seeded ribbon cane	8.34 tons per acre

Three-fourths of an acre of Japanese cane was grown on an adjacent plot and harvested for the silo and the yield was 28 tons per acre. An excessive rainfall in August made this tonnage of Japanese cane possible.

HORTICULTURAL WORK.

This work has continued under the direct supervision of Mr. E. J. Watson, Horticulturist of the station.

The principal fruit and the truck crops included in this work were peaches, apples, pears, plums, figs, grapes, pecans, sweet and Irish potatoes, tomatoes, beans, strawberries, watermelons and cantaloupes.

The seedling peach work, which has been outlined in previous reports, was continued and there are now in the orchard 175 trees representing the best seeding varieties. Others have been found to be inferior and have been discarded. Late frosts last spring destroyed the crop on all of the trees except three Indian seedling varieties and they set and matured a heavy crop of very fine peaches. In the orchard there are 32 standard varieties of peaches, but the late frosts prevented them from setting fruit.

The work with apples consisted of collecting varieties that appear to be promising for this section and spraying to control rot diseases which attack the fruit.

There are now in the orchard 150 trees, representing 32 varieties. Only a few of these trees have come into bearing and some of them are quite promising for this section.

The work with pears has been to test varieties for blight resistance. The blight is the only trouble here and if a blight-resistant variety could be found this fruit could be grown in great abundance. We have a number of young grafted trees from an old tree at the Audubon Park Experiment Station which has never shown any indications of blight and we are interested to see if they will prove blight-resistant here.

We have twenty of the leading varieties of pecans in the orchard, but they have not yet reached the bearing age.

We now have 600 magnolia fig trees in rows four to six feet apart. These trees are cut off at the surface of the ground each fall and the crop the following year is obtained from new growth. In this way freezing of the trees is prevented. This variety will produce edible fruit on the first year's growth, but many of the other varieties will not do this.

The grape work has been enlarged and there are seventy varieties represented in the vineyard. Fifty of these bore fruit the past season and some of it was of very fine quality. The bagging experiments were continued with very satisfactory results. Enclosing the bunches of young grapes in cheap paper bags has been as effective in preventing the rot diseases as spraying and for the ordinary farmer the bagging is much easier and more practical.

The Irish potato work, which has been in progress for a number of years, was continued with results similar to those of previous years. This work has included seed selection, home-grown vs. bought seed; variety and fertilizer tests, and growing a fall crop. The Lookout Mountain variety has given best results for fall planting. It is distinctly a fall potato and the seed will keep perfectly until planting time, which is in the latter part of July. Every farmer should grow at least enough fall potatoes for home consumption.

A large number of varieties of tomatoes, watermelons and cantaloupes have been tested, with especial attention to blight-resistant varieties of tomatoes and cantaloupes. The Fusarium wilt or blight failed to appear in the tomatoes the past season and, therefore, no data were obtained along that line.

During the past year the station has erected a creosoted stave silo 14 x 30 feet, a creosoted water tank for live stock 10 x 16 feet, purchased 13 cows, a shorthorn bull, a Duroc Jersey boar and a Duroc Jersey gilt.

The correspondence has been fully up to the normal. We have written 980 letters, 813 form letters, and have mailed out many bulletins in connection with the correspondence.

The North Louisiana Agricultural Society continued to hold its regular monthly meetings here, and the station officials always took a leading part in making them a success.

The North Louisiana Agricultural Camp Meeting Fair, one of the oldest in the State, was again held on the grounds of the station, October 28, 29 and 30, and was considered the best that has ever been held here. A great variety of agricultural products were on exhibition and the girls' canning club of the parish had a most creditable display of canned products.

The Experiment Station officials took a leading part in this fair and arranged an interesting and instructive program for the benefit of the farmers of the State. A number of the leading agriculturists of the country came here and delivered very interesting and instructive lectures covering subjects of vital importance to the agricultural interests of the State.

RICE EXPERIMENT STATION.

F. C. Quereau, Assistant Director in Charge.

FERTILIZER EXPERIMENTS.

Twenty-seven plots are devoted to this line of work. We are testing acid phosphate in different amounts when used alone and when used in combination with potash and cotton seed meal. Potash in the form of Kainit is being tested in the same manner. We are using a mixture of acid phosphate, potash and cotton seed meal in different amounts. The maximum application being as high as 1500 pounds per acre. We have eight plots in which we are testing the different sources of phosphorus. Basic slag and raw rock phosphate are being used in this test.

CONCLUSIONS THAT MAY BE DRAWN FROM THESE EXPERIMENTS.

(1). It is likely that 16% acid phosphate is our best and cheapest source of phosphorus. The results of the past five years indicate that a 200-pound per acre application will give the best and the cheapest returns.

(2). Kainit when applied to old rice land seems to make considerable increase in yield the first year, but in succeeding years the yield is but little better than the yield on the check plots, where no fertilizer has been used. Applications of phosphate and kainit in equal parts do not make increase in yield over the plots where phosphate is used alone.

(3). It is indicated by these experiments that cotton seed meal may profitably be applied to Honduras rice, but that the returns are not so great with Blue Rose or Shinriki, this especially marked in the case of the former. It is not believed that it is profitable to use cotton seed meal or other nitrogenous fertilizer on Blue Rose rice.

(4). Water crab grass is observed to grow on all plots fertilized with acid phosphate. This was especially noticeable last year (1914). On plots fertilized with kainit and where there was no fertilizer there was little if any crab grass. On the phosphate plots there was a heavy stand of grass which could not be checked with water and which caused considerable decrease in the yields of rice in these plots.

As these results clearly indicate that phosphate promotes the growth of grass as well as the growth and yield of rice, it would seem that the fertilizer should be placed as close to the rice plant as possible. In other words, the fertilizer should be placed in the row with the seed, but not in contact with it. In this way the rice would get the benefit of the fertilizer first and would have a better chance to get away from the grass.

(5). It is good practice to drain the land fifteen days from the time of the first flooding. This will check the activity of the ''root maggot,'' and it is believed that the drying out of the land at this time is a good thing for the rice. Where it is possible to do so, the land should be drained twice during the irrigating season.

ROTATION EXPERIMENTS.

Fourteen plots are devoted to this work. There are two two-year rotations, one three-year rotation, and two four-year rotations.

The object of these rotations is to find some crop or crops which will be profitable on rice land in rotation with rice.

The results indicate that highland crops will, if continued long enough, eliminate red rice. Corn, sorghum, cow peas, oats, and sugar cane are profitable crops on rice land. Corn and oats should be fertilized with cotton seed meal or other nitrogenous fertilizer. One hundred pounds 16% acid phosphate and 200 pounds of cotton seed meal per acre produced a yield of 38 bushels per acre of corn on land that had never before been planted to a highland crop.

It is believed that a rotation less than six years on a rice farm will not be profitable.

(1). Because a two, three, or four year rotation with highland crop is not long enough to eliminate the red rice.

(2). In changing from the highland crop to rice it is necessary, in a large measure, to close drains with the levee system. In going from rice to a highland crop all of the levees must be removed and drains opened which are not only unnecessary for rice but interfere with work. Changing from one system to the other, therefore, is very costly, consequently the rotation should be made as long as possible.

It is suggested that the land be planted to highland crops for six years. At the end of this period the drains will require attention if the highland crops are to be continued. Levee the land, leaving only those drains which are necessary for rice, and plant the area to rice six years in succession. Exercise care that the land does not become seeded to red rice.

Another factor to be considered in connection with the long rotation is the fact that rice makes but little if any use of the nitrate form of nitrogen. Rice uses the ammoniates. After six years of highland crops the soil would contain an abundance of vegetable matter. Under irrigated conditions of rice this vegetable matter would tend to break down into ammoniates which could be made use of by the rice. From the data which we have with reference to yields of rice on new land it is reasonable to believe that by the use of acid phosphate the yield for rice can be maintained to a profitable maximum during six years.

During the year 1914 the usual number of highland crops were grown. The only departure from previous years was the testing of a number of varieties of cotton. The summer season being less rainy than usual, the yield of cotton averaged about half a bale per acre. This is above the average for rice land.

The only improvement made during the year was the installation of a Smith drainage machine. This was put in to protect our highland crops from back water during excessive rains.

An agricultural society was formed among the farmers. This society meets the last Saturday of each month at the Experiment Station. The Assistant Director is secretary and treasurer. The average attendance during 1914 was forty-five farmers.

FINANCIAL STATEMENT.

HATCH AND ADAMS FUNDS.

Dr.	Hatch Fund	Adams Fund
To receipt from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1914, under Act of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By salaries	$10,561.95	$11,575.52
Labor	2,093.43	418.84
Publications	586.10	.....
Postage and stationery	47.97	27.54
Freight and express	82.79	71.67
Heat, light, water and power	16.56	285.85
Chemicals and laboratory supplies	....	147.81
Seeds, plants, and sundry supplies	178.77	147.17
Fertilizers	101.95	.....
Feedstuffs	297.83	541.76
Library	198.00	295.96
Tools, machinery and appliances	222.37	17.81
Furniture and fixtures	134.04	226.45
Scientific apparatus	.....	630.00
Live stock	105.00	175.00
Traveling expenses	7.20	294.69
Contingent expenses	20.00	.....
Building and repairs	346.04	143.93
Total	$15,000.00	$15,000.00

STATE FUND.

Receipts—		
Received from the State Treasurer	$23,041.70	
Fertilizer and Feedstuff Fund for Station accounts	3,000.00	
Interest on daily balance	225.55	
Refunds	881.21	
Farm products	2,852.00	
Deficit, Nov. 30, 1914	1,494.17	
		$31,494.63
Expenditures—		
Salaries	$10,818.39	
Labor	4,469.32	
Publications	434.45	
Postage and stationery	616.51	
Freight and express	525.21	

Expenditures—	Hatch Fund	Adams Fund
Heat, water and lights	457.63	
Chemical supplies	31.68	
Seeds and sundry supplies	1,429.11	
Fertilizer	410.47	
Feedstuffs	980.69	
Library	136.41	
Tools, implements and machinery	1,588.47	
Furniture and fixtures	201.60	
Live stock	1,807.55	
Traveling expenses	2,271.56	
Contingent expenses	1,401.47	
Building and repairs	2,102.90	
Deficit, Dec. 1, 1913	1,811.21	
		$31,494.63

FERTILIZER AND FEEDSTUFFS FUND.

Receipts—		
Cash on hand Dec. 1, 1913	$ 2,117.77	
Miscellaneous sales	6.00	
Commissioner of Agriculture	16,500.00	
Refund	1.00	
Deficit, Dec. 1, 1914	414.94	
		$19,039.71

Expenditures—		
Salaries	$ 8,213.03	
Labor	708.90	
Publications	1,660.60	
Postage and stationery	287.05	
Freight and express	110.09	
Heat, water and light	860.24	
Chemicals	1,488.45	
Seeds and sundry supplies	199.65	
Feedstuffs	4.85	
Library	7.09	
Furniture and fixtures	80.87	
Tools, implements and machinery	3.86	
Apparatus	471.39	
Building and repairs	281.26	
Live stock	1,662.38	
For station accounts	3,000.00	
		$19,039.71

AUDUBON PARK SUGAR EXPERIMENT STATION REPAIR FUND.

Cash on hand Dec. 1, 1913	$ 273.51	
Nov. 4, 1914, State Treasurer	1,000.00	
		$1,273.51

Expenditures—		
Building and repairs	$ 1,234.51	
Cash on hand Dec. 31, 1914	39.00	
		$1,273.51

Western Washington
Experiment Statio

TWENTY-EIGHTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

FOR 1915

TO THE GOVERNOR

By W. R. DODSON, Director

Baton Rouge, La.
Ramires-Jones Printing Co.
1916

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR LUTHER E. HALL, President.
T. JONES CROSS, Vice President Board of Supervisors.
E. O. BRUNER, Commissioner of Agriculture and Immigration.
THOS. D. BOYD, President State University.
W. R. DODSON, Director Experiment Stations.

MEMBERS.

HENRY GERAC, Lafayette
JOHN J. HENDERSON, Lagan
JOHN T. COLE, Monroe
R. E. THOMPSON, Wilson
J. E. BULLARD, Belmont

STATION STAFF

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
A. P. KERR, M. S., Assistant Director, Baton Rouge.
C. E. HESTER, B. S., Assistant Director, Calhoun.
F. C. QUEREAU, M. S., Assistant Director, Crowley.
W. H. DALRYMPLE, M. R. C. V. S., Veterinarian, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Assistant Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
C. W. DAVIS, Assistant Plant Pathologist, Baton Rouge.
F. V. EMERSON, Ph. D., in charge Soil Survey Work, Baton Rouge.
E. W. KERR, M. E., Mechanical Engineer, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge
J. B. GARRETT, B. S., Entomologist, Baton Rouge.
√E. S. TUCKER, Associate Entomologist, Baton Rouge.
W. L. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
M. A. SCHNELLER, Ph. D., Chemist, Audubon Park, New Orleans.
G. D. CAIN, B. S., Chemist in Charge of Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
J. M. JENNINGS, M. S., Assistant Chemist, Baton Rouge.
S. BYALL, B. S., Assistant Chemist, Baton Rouge.
I. SELECTER, B. S., Soil Chemist, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
W. P. DENSON, B. S., Assistant Chemist, Baton Rouge.
MRS. EDITH STRONG, Secretary to the Director, Baton Rouge.
MISS MAYME DWORAK, M. A., Scientific Asistant in Charge of Seed Laboratory, detailed by U. S. Department of Agriculture, Baton Rouge.
J. K. McHUGH, Clerk and Stenographer, Audubon Park, New Orleans.
R. P. SWIRE, A. B., Treasurer, Baton Rouge.
C. B. ANDERS, B. S., Assistant Animal Husbandman, Baton Rouge.
R. C. CALLOWAY, B. S., in Charge of Dairy, Baton Rouge.
A. D. SUMMERS, Farm Manager, Baton Rouge.
C. J. BARILLEAUX, Farm Manager, Audubon Park, New Orleans.
J. A. WEDGEWORTH, Mailing Secretary, Baton Rouge.

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE,

OFFICE OF EXPERIMENT STATIONS,

BATON ROUGE, LA., January 15, 1916.

To His Excellency, Luther E. Hall,
Governor of Louisiana:

Sir—I am pleased to submit herewith the annual report of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the year 1915. As required by act of the National Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional federal funds for research work at the experiment stations of the several states, a financial statement is submitted for the year beginning July 1, 1914, and ending June 30, 1915.

FINANCIAL STATEMENT.

The state appropriation for the experiment stations is kept in a separate account from that of the federal funds, as will be shown by the complete financial statement submitted herewith.

HATCH AND ADAMS FUNDS.

	HatchFund	AdamsFund
Dr.		
To receipt from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1915, under Acts of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By salaries	9,831.52	11,554.06
Labor	2,537.63	405.36
Publications	1,040.68	....
Postage and stationery	12.40	22.91
Freight and express	....	65.86
Heat, water and lights	....	209.35
Chemical supplies	9.30	36.04
Seeds, plants and sundry supplies	141.10	133.09
Fertilizers	....	....
Feeding stuffs	790.43	526.75
Library	....	132.14
Tools, machinery and appliances	89.25	79.63
Furniture and fixtures	26.82	23.90
Scientific apparatus	....	1,191.47
Live stock	....	191.60
Traveling expenses	....	374.52
Contingent expenses	20.00	....
Building and repairs	500.87	....
	$15,000.00	$15,000.00

STATE FUND.

(Dec. 1, 1914, to Nov. 30, 1915.)

Receipts—		
Received from the State Treasurer	$24,500.00	
Miscellaneous sales	5,119.66	
Refunds	806.92	
Interest on daily balances	85.19	
Fertilizer and feedstuffs fund for station accounts	3,000.00	
Deficit Nov. 30, 1915	2,132.69	
		$35,644.46
Expenditures—		
Salaries	$10,344.78	
Labor	5,203.64	
Publications	643.46	
Postage and stationery	488.13	
Freight and express	574.44	
Heat, water and light	326.10	
Chemical supplies	31.67	
Seeds and sundry supplies	1,423.12	
Fertilizer	431.43	
Feedstuffs	1,354.39	
Library	92.19	
Tools, implements and machinery	1,054.80	
Furniture and fixtures	303.76	
Scientific apparatus	29.06	
Live stock	4,374.43	
Traveling expense	1,483.96	
Contingent expense	1,589.52	
Building and repairs	4,401.41	
Deficit Dec. 1, 1914	1,494.17	
		$35.644.46

FERTILIZER FUND.

(Dec. 1, 1914, to Nov. 30, 1915.)

Receipts—

Commissioner of Agriculture	$17,000.00	
Miscellaneous sale	4.00	
Refund	40.00	
		$17,044.00

Expenditures—

Salaries	$ 7,535.86	
Labor	874.02	
Postage and stationery	333.49	
Freight and express	101.90	
Heat, water and light	814.89	
Seeds and sundry supplies	293.08	
Feedstuffs	9.45	
Chemical supplies	832.35	
Library	4.21	
Furniture and fixtures	38.03	
Tools, implements and machinery	2.08	
Scientific apparatus	400.30	
Traveling expense	85.97	
Building and repairs	131.55	
For station accounts	3,000.00	
Deficit Nov. 30, 1914	414.94	
Cash on hand Nov. 30, 1915	2,171.88	
		$17,044.00

AUDUBON PARK REPAIR FUND.

Receipts- -

State Treasurer	$ 2,000.00

Expenditures—

Building and repairs	$ 2,000.00

The Louisiana law requiring the semi-annual publication of the statement of receipts and expenditures has been complied with, and all accounts have been examined quarterly by the Supervisor of Public Accounts and found satisfactory. A representative of the United States Department of Agriculture has also examined the books and vouchers of the federal funds and has given his approval to all expenditures.

ADMINISTRATIVE.

On the whole, the work of the stations has made satisfactory progress and we have had no important change in the personnel of the Experiment Station staff.

During the year as Director of the Stations, I have continued to act as Dean of the College of Agriculture and Director of the Agricultural Extension Work under the Smith-Lever Act. I have also continued to serve as a member of the committee of three in the management of the Iberia Experiment Farm under the auspices of the federal government. I have also served as directing official for the Live Stock Extension Service conducted by the federal government in cooperation with Louisiana State University during the past year. With these many duties to discharge, it has been impossible to give as much attention to the Experiment Stations as their importance would justify, but we have been fortunate in having a competent assistant at each station who has served for several years in this capacity, and who is thoroughly familiar with all of the details of the work.

SHORT COURSES AND AGRICULTURAL FAIRS.

Most of the members of the Experiment Station staff have given a portion of their time to what might properly be called extension work in aiding parish fairs, the state fair, and the numerous short agricultural courses that have been held in different portions of the state. The growth of the extension work of the institution and increasing funds to provide for it is gradually diminishing the necessity for spending experiment station money for work of this kind, and it is to be hoped that in the near future, experiment station funds can be used exclusively for research work.

EXPERIMENT STATION DAIRY.

In October, 1915, a herd of Holstein cattle was added to the dairy with the view of making some practical tests of the adaptability of this breed for the utilization of some of our available forage crops comparing the cost of keep and the amount of product given with the record of the Jerseys. To aid in carrying out the plan outlined in the college course for giving instruction in dairying, the Experiment Station Dairy has ceased to sell milk at retail, delivering the entire product to the L. S. U. Creamery.

FERTILIZER AND FEED STUFFS LABORATORY.

The laboratory of the Experiment Station at Baton Rouge has continued to analyze the samples of feed stuffs and fertilizers for the State Board of Agriculture and Immigration as usual. It would seem, however, that this is almost a useless work under the present method of administration of the law. If a fertilizer or feed stuff falls below the guarantee or is otherwise fraudulent, no steps are taken, so far as I know, to stop the perpetration of the fraud. It would be a relief to the Experiment Stations to either have the law amended so as to make it effective, or have the names of the members of the Experiment Station staff disassociated with the work.

STATION No. 1, SUGAR EXPERIMENT STATION

Audubon Park, New Orleans.

W. G. Taggart, Assistant Director.

The year 1915 is one that will long be remembered in the history of this station. It is remarkable that the annual rainfall, 73.69 inches, surpasses the precipitation for any other year on our records, and that during this same year we suffered one of the most severe droughts, practically no rain falling from March 4 to May 6. On September 29, we were visited by a hurricane which did heavy damage to out buildings and fences, and interfered with our field experiments.

The results from potash fertilizer test on sugar cane were unusual for this station. A complete fertilizer containing ninety pounds sulphate of potash per acre showed an increase over check plots fertilized with equal amounts of nitrogen and phosphoric acid without potash, of 3.03, 3.55 and 1.73 tons.

A comparative test of the newer nitrogenous materials with well known nitrogenous fertilizer indicates that calcium cyanamid will rank close to nitrate of soda and sulphate of ammonia, and probably is better than tankage. The difficulty of mixing it with acid phosphate still exists, and unless this material could be had at a more reasonable price than nitrate or sulphate, the cost of applying it, as the exclusive source of nitrogen, would likely decrease its usefulness. Calcium nitrate has not proven as satisfactory on cane as on corn.

An experiment with varying quantity of phosphoric acid used with a constant quantity of nitrogen has been carried on for four years on cane; a mixture of 500 pounds of cottonseed meal and 250 pounds of acid phosphate shows an increase of 2.7 tons over no fertilizer, while a mixture of 500 pounds of cottonseed meal and 500 pounds of acid phosphate per acre, shows an increase of 8.9 tons.

A duplicate of the above experiment using tankage as a source of nitrogen, shows an increase of 1.4 tons in the first case, and 8.4 tons in the second case. These figures are an average of two years plant and two years first year stubble, eliminating one section in the first experiment with cottonseed meal.

In April it was decided to take advantage of the drought to demonstrate the value of irrigation. A one-inch pipe line was connected to the city water and water equivalent to one and one-half inches of rain applied on three separate dates, April 29, May 17, and May 26. While this small quantity of water was not sufficient to answer the full needs of a growing crop, it was sufficient to cause an increase of 7.6 tons of cane over an unirrigated check plot.

Propagation of new varieties of sugar cane by growing seedlings as our most important field work has been continued. Seedling L 511 made a good growth and showed a sucorse content of 14.9 per cent. in juice; this being 4.5 to 5 per cent. higher than the juice of the cane grown on the average plantation. L 231 is probably the next best variety in our possesion, and should grow a much larger tonnage than D 74 and is as rich in sugar as Louisiana Purple. L 218, 219, 226, 253, 294, 454 are all good canes. The demand from planters for these varieties is heavier than our supply will accommodate. Four hundred and ninety-four new seedlings were propagated and transferred to our plots.

The work of developing a white flint corn has progressed. A white flint corn very similar to Yellow Creole has been grown, and our next endeavor will be to fix a type.

Experiments as to the time of applying fertilizers to corn seem to show that application before or after planting is optional; corn fertilized before planting yielded 49.85 bushels, while corn fertilized after planting yielded 51.45 bushels.

A comparative test of cow peas, velvet beans and soy beans as a green crop to be turned under seemed to give the velvet beans a slight advantage.

The use of bagasse as a source of fertilizer seems to indicate that bagasse has no value in that respect. Corn grown on land where bagasse has been applied for three years yielded five bushels less than corn grown on land where nothing had been applied. At the same time, corn grown on land where cowpeas had been turned under for three years, yielded fifteen bushels more than the bagasse plots. Nitrogen applied to corn over bagasse for three years consecutively has given unsatisfactory results, and will be discontinued.

Other fertilizer experiments with corn are: First to determine the proper proportion of nitrogen and acid phosphate; second, the most economical quantity that can be used in connection with peavine fallow. To date, the only point clearly indicated in the responsive power of stiff soils to peavine fallow as well as to nitrogenous fertilizers. Weather conditions have interfered with these experiments.

Variety tests with corn continue to indicate that, in general, Yellow Creole is most suitable to local conditions as a general field crop.

Alfalfa was grown successfully; 8.6 tons of cured hay per acre being produced. With such yields this crop could be grown as an annual.

Clovers, oats and vetches suffered from unfavorable weather at time of planting, and no valuable data was secured this year. Kudzu has made a wonderfully rank growth, and a large amount of forage. Plants put out three years ago produced such heavy growth this season that the Johnson grass in adjacent plots has been overrun and almost completely smothered out, suggesting the possibility of utilizing kudzu for the eradication of this pest, as well as for the production of forage.

The co-operative laboratory of the United States Bureau of Entomology has imported a parasite of the cane-borer (Tachinophyto). We are glad to report that the new parasite has taken hold.

Poisoning with arsenate of lead decreased the borer infestation from 24 per cent. to 5 per cent. Both of these experiments will be vigorously prosecuted during next year.

The Luce cane harvester was tried out, merely for adjustment, before going out on plantations.

The James Mallon steam turnplate was tried during the grinding season and showed an increased sucrose extraction of 5.88 per cent. and delivered a bagasse containing 55 per cent. moisture against a bagasse containing 62 per cent. moisture, using no maceration.

The eighth annual field day meeting of the Louisiana Sugar Planters' Association was successfully held on the grounds June 10.

BACTERIOLOGICAL DEPARTMENT

W. L. Owen.

Project 1. A Study of the Deterioration of Sugars, and Principal Factors affecting same.

The "factor of safety" of the Colonial Sugar Refining Co., of Australia, is that the moisture of a sugar shoul dnot be more than half the non-sugars, or when $\frac{W}{100\quad} - P = < .333$ the sugar will not deteriorate. A study of 46 samples of sugar, procured from various plantations throughout the state, showed forty per cent. to be safe from the above factor. Sixty per cent. of the samples deteriorated when stored in the incubator, where they were exposed to an elevated temperature and high humidity. The average per cent. of moisture for the deteriorated sugars was 1.64, the minimum 1.26 with a factor of .488. The average degree of infection of the deteriorated samples was 245,102, while that of the good keeping samples was 5,580. Of the samples that did not deteriorate the maximum infection was 11,000 with a factor of

.242, while the minimum degree of infection of the deteriorated samples was 2,200 with a factor of .488.

Of the plantation white sugars kept under observation only 14 % deteriorated under natural conditions, while 71 % were safe according to the factor. The average degree of moisture of the deteriorated samples was 0.43% with a minimum of 0.17%, the latter having a factor of .340, while the average degree of moisture of the good keeping samples was .03 with a maximum of .06.

From these results, it appears that neither the moisture alone, nor when used in conjunction with the factor of safety, furnishes a reliable criterion of the keeping quality of a sugar, but that its degree of infection must also be taken into consideration. This investigation is to be continued with particular reference to the influence of the non-sugars upon deterioration, and of the influence of moisture and acidity. A large number of samples of plantation sugars have been collected from this year's crop. The co-operation of the planters was again most gratifying, and this co-operation was doubtless encouraged by the reports made to them from this station on the behavior in storage of the samples donated last year.

Project 2. A study of the species of microorganisms causing deterioration of sugar was carried out during the year with a view of determining (1) the relative deteriorative ability of the different species. Eighteen cultures of bacteria and twenty cultures of yeast were obtained from sugar. There appears to be considerable variation in the deteriorative power of the different species, which is not altogether obliterated by repeated cultivations. Sugars from widely distant countries show no greater variation in this respect than sugars from adjoining plantations. In order to determine the principal sources through which sugars become infected with deteriorative microorganisms, some experiments were conducted during the past grinding season in connection with the experiment station sugar house. It was observed that the microorganisms found in sugars do not predominate either in the mill juice, or on the cane leaves. Analyses showed these sugar deteriorative forms to occur only to the extent of 19.5% in the fresh juice. From this point they increase to 46%

and 91.5% in the sulphured and defecated juice respectively. The filter press appears to be the vital point in determining the infection of the finished sugars.

The aid at the centrifugal was found to average 5,683 micro-organisms per liter, the predominant species of which were of the deteriorative type.

Project 3. The identification and study of the action upon the purity of cane juice, of a certain species of bacteria commonly occurring in the interior of borer-infested cane.

This investigation resulted in finding this to be a distinct and hitherto undescribed species of bacteria, to which we have given the name bacterium saccharum officinarum. Inoculation experiments upon cane showed, however, that it is not a great factor in the deterioration of the juice of the growing cane, hence its presence there does not apparently aggravate the deterioration following borer infestation.

Project 4. A study of the bacterial flora of cane juice with particular reference to these species, which are active in the various spontaneous fermentations that this product undergoes. About twenty cultures of bacteria have been isolated, among which are many interesting chromogenic forms, and others which appear to be undescribed species. The identification and study of these species is to be reserved for a future time. The presence in a living condition of a number of yeast forms, in filter press juice collected under aseptic conditions, indicate a thermophilic tendency on the part of these species, which suggests a further study of their characteristics, and the part they play in deterioration of sugar house products.

RESEARCH CHEMICAL DEPARTMENT

M. A. Schneller.

Project 1. The chemical department is conducting a research into the nature of the coloring matters of sugar cane. The results so far obtained show that substances belonging to the polyphenocle are present in cane, especially the eyes and tops, and cause in connection with iron the dark color of juice and syrup. The action of boiling temperatures and sulphur dioxide in the sugar houses, results only in a temporary decomposition and reduction of the polyphenol iron compound and decolorization of the products. The darkening of plantation white sugars in storage must be sought in reoxidation of adhering or occluded traces of the iron-polyphenol. Decomposition products of a similar nature (glucinic acid) are also formed by the action of lime at alkaline reaction on glucose. Alkalinity is, however, avoided in the white sugar manufacturing in this state. A means of elimination of the polyphenols could be found in the bone-black process, generally discarded as too costly. Elimination of iron by secondary carbonation, or a similar process has the same result, but would be successful only if further contact of the liquors with iron were completely avoided. Lining of the iron equipment with rustproof enamel might lead to a distinct improvement.

The incrusting coloring matter of cane fiber, although perhaps the physiological product of the above mentioned polyphenols and of a similar chemical composition—coniferin or a derivative—does not yield dark-colored iron compounds and owing to its firm combination with the lignin of the cell walls is only separated with difficulty and would not easily pass into the juice.

Project 2. Another object of investigation pertains to the methods of direct sucrose determination in the presence of reducing sugar based on the action of small amounts of alkali on the rotary power of the latter.

The sumary of these experiments in that several sources of error are inherent to these methods:

(1) The residuary levorotation, introducing a considerable error, especially with material high in reducing sugar and with methods using a weak concentration of alkali.

(2) Stronger concentrations of alkali reduce this levorotation, but introduce a second serious error due to the decrease of sucrose rotation by the neutralized alkali.

(3) The incidental use of oxidants (as hydrogen peroxide) causes also destruction of sucrose. Apparently correct results are possible by compensation of errors due to 1 and 3.

STATION No. 2, STATE STATION.

Baton Rouge.

A. P. Kerr, Assistant Director.

The following is a brief statement of the projects that have been carried on at this station during the year 1915.

Project: Silage Production.

As the production of silage is one of the most important problems to the beef and dairy industry in this state, experiments were started to ascertain the cost of production and the feeding qualities of silage from Japanese cane, corn, sorghum and soy beans. Also to determine the influence on soil fertility from continued cropping with these crops, returning to the plots the manure produced while the cattle are consuming the silage from the respective plots.

The silage made from Japanese cane is not of as good quality as that of corn and sorghum alone, or corn and sorghum mixed with soy beans. Although cattle will eat it if fed in connection with cottonseed meal or molasses and very good results can be secured, it is impossible to get them to eat as much of this silage as they will of the corn and sorghum. Since Japanese cane grows from stubble each year and needs very little cultivation, the cost of production is very light, although it costs nearly twice as much to harvest this crop as it costs for corn and sorghum, because it must be harvested by hand. On ordinary land Japanese cane will produce twenty-five to thirty tons per acre.

Soy beans planted in rows and cultivated, must be harvested with a mowing machine and raked up. Until the tonnage reaches about ten, soy beans will produce about as much silage per acre as corn.

We have found that a mixture of corn and soy beans gives better silage than any kind of silage that we have tried. The protein content is about three times greater than either corn or sorghum silage alone.

This experiment has not been conducted a sufficient length of time to give accurate data regarding the increase of soil fertility from the application of the manure to the respective plots.

Project: Commercial Fertilizer.

The object of this experiment is to determine the influence of the application of commercial fertilizer to corn land at different intervals. Results indicate that there is practically no difference in the yield from the application of all of the fertilizer before planting, all during cultivation, or half before planting and half during cultivation.

Project: Corn Culture.

The object of this experiment is to determine the influence of removing suckers from corn. The yield of corn from this experiment showed a slight increase where the suckers were removed, but the increase was not sufficent to compensate for the labor used in removing the suckers.

Project: Corn Culture.

The object of this experiment is to determine the influence of clover, cowpeas and stable manure in increasing soil fertility. A plot where cowpeas were planted with the corn when it was laid by, followed by a crop of clover in the fall with a light application of stable manure every three years, produced about five times as much corn as a plot receiving the same cultivation without an application of stable manure or the turning under of leguminous crops.

Project: Forage Crops.

Of the new forage crops recently experimented with, Sudan grass seems to be the most promising. We find that the best time to plant Sudan grass in this locality is about April 1st. Twenty pounds per acre seems to be the best quantity of seed to sow. On thin land the yield is about two to three tons per acre, but on rich soil a yield is secured of eight to ten tons per acre. The crop should be cut for hay just as it is coming into bloom.

Project: Varieties of Corn.

About twenty varieties of corn have been tried under the same conditions with variable yields. The Calhoun Red Cob, Yellow Creole, and a few others, have given best results in yield and in keeping quality.

Project: Ramie.

From the standpoint of production ramie is a very successful crop in this state, but up to the present time machinery has not been perfected for profitably decorticating the fibre.

Project: Special Selection of Seed Corn.

A careful test is being made of the selection of seed corn in the field for the improvement of varieties.

Project: Velvet Beans.

For the past two years we have carried on some experiments in co-operation with the Bureau of Plant Industry, United States Department of Agriculture, as to the adaptability of various hybrid velvet beans to this soil and climate. We have not yet secured a variety that is entirely satisfactory in regard to the maturing of seed.

Project: Soil Fertility.

Results from the application of raw rock phosphate and lime, and lime and phosphate applied separately to a plot that had a crop of red clover turned under indicated that there was practically no difference in the yield of corn from these plots and the plots that had a crop of red clover turned under without the application of raw rock phosphate or lime.

Project: Pork Production.

By the use of rotations recommended in Circular No. 3, pork is produced on a profitable basis. Hogs that have grazed corn and cow peas, soy beans, and sweet potatoes, then fed for ten days on corn, have been pronounced "hard" hogs by the packer.

Project: Kudzu.

We have grown kudzu on this station for about five years and find that it takes about three years for the crop to become well established. After that time it makes rapid growth. It does not give much promise as a hay crop because of the difficulty in harvesting, but it gives good results as a grazing crop.

Project: Para Grass.

This grass has been tried out for the past several years and has finally been discarded as being of no practical value.

Project: Rhodes Grass.

Rhodes grass has been tried out for several years and has been found inferior to other grasses which are already established.

During the year the station purchased two grades of Percheron mares from Tennessee for farm work and for breeding purposes. During the years these mares have worked about eight months, and they have each raised a mule colt.

DEPARTMENT OF PLANT PATHOLOGY

C. W. Edgerton, C. C. Moreland,
C. W. Davis

The work of the Department of Plant Pathology during 1915 has been a continuation of the projects which have been under investigation for several years. This includes a careful study of a number of the most serious of our crop diseases. In Louisiana, plant diseases are particularly important on account of the mild winters, the heavy rainfall and high humidity. The work has included a study of the organisms causing the diseases, the effect on host plants, a careful consideration of climatic factors on development and a study of the possible methods of control. The projects which are under investigation and a summary of the results obtained during the past year follow:

BEAN DISEASES.

Project: Life history of the organisms causing the bean anthracnose and bean blight diseases, reaction to environmental and climatic factors such as temperature, methods of control, etc.

Two phases of the bean anthracnose problem have been considered in 1915, these being the effect of high temperature on the fungus and the question of varietal susceptibility. As in previous years, our experiments have shown that the bean anthracnose will not tolerate continued high temperature. The optimum temperature for growth was found to be between 21 and 23 C, and the maximum temperature at which growth would take place was 30 or 31 C. These are comparatively low and explain why the disease will not develop in Louisiana during the summer months. The results obtained have already been published in Phytopathology.

The work on varietal susceptibility has borne out the results obtained by Barrus. The cultures which have been used in the experimental work showed considerable difference in regard to their ability to infect different bean varieties. The results obtained will soon be published in a bulletin.

The project on bean diseases has been discontinued for the present and unless something unforeseen develops, it will not receive attention during 1916.

COTTON BOLL ROTS.

Project: Life history of the organisms causing the rot of cotton bolls, methods of dissemination, means of control, etc.

While there are several organisms causing rot of cotton bolls, only the one causing the anthracnose, Glomerella gossypii has been under investigation in 1915. Some data on the effect of temperature on the development of the fungus was obtained and published. Also some experiments on varietal resistance were continued from previous years. Results from three years work on varietal resistance, show that varieties do not show any very marked difference in regard to their susceptibility to the anthracnose. These results are in press and will soon be published in bulletin form. The cotton boll rot has also been discontinued and will not receive attention during 1916.

SUGAR CANE DISEASES.

Project: Life history of the organisms causing the various diseases of sugar cane including the red rot, rind disease, root rot, stem rot, and the rots of planted cane.

Considerable attention has been paid to the effects of various organisms on planted cane in regard to germination. The poor germination of cane constitutes one of the greatest losses in the sugar industry in Louisiana as it necessitates the planting of a considerable percentage of the crop raised. Several organisms besides insects and certain physiological factors, are concerned in this poor germination. Plots have been planted at Audubon Park for several years with cane inoculated with several of the rot organisms. The results obtained in 1915 agree with those of previous years, showing a poor germination with cane inoculated with the red rot fungus.

TOMATO WILT.

Project: Life history of the organism causing tomato wilt, methods of dissemination, means of control, etc. Also the possibility of obtaining wilt resistant strains and the best methods of selection for obtaining them.

In 1915 a considerable number of cultures of the fungus have been tested out in order to see if the different ones would show a varying amount of virulence and also to see if there are different strains which react differently with the various tomato varieties. Some strains were very virulent while others were weak, but no evidence was obtained to show that any of the strains had become specialized on some variety or varieties and would not infect others. Many selections for wilt resistance have also been made. A new method of seed bed selection has been worked out which promises to give good results in the selection work. It is possible to select plants in the seed beds and thus save a great deal of labor and garden space. Selection work with some hybrid tomatoes has also been continued in the field.

COTTON WILT.

Project: Life history of the organisms causing cotton wilt, methods of dissemination, means of control, comparison with the other wilt diseases, selection for wilt resistance.

Work on this project during 1915 has been a continuation of the selection work that has been carried on for several years.

EGGPLANT BLIGHT.

Project: Life history of the organism causing eggplant blight and rot, methods of dissemination, comparison of different strains, means of control.

The pathogenicity of a large number of different cultures has been studied during 1915. This has seemed necessary as the cultures show a wide range of variability. Many interesting facts such as the presence of the fungus within the seeds have been determined.

SCLEROTIUM WILT DISEASE.

Project: Life history of the organism causing the disease, effect on various hosts, means of control, etc.

Very little work was attempted on this problem in 1915. Observations on new host plants and severity of the disease were made but no experiments were conducted.

ALFALFA DISEASES.

Project: A study of the factors which limit alfalfa production in Louisiana, including drainage, soil acidity, climate, inoculation and diseases, also the life history of the disease causing the crown rot.

As in previous years, alfalfa plots have been grown to determine the effect of lime, drainage, inoculation, fertilization, etc., but the plants practically all died during the rainy weather in mid summer. Peruvian alfalfa was planted in the plots in the fall.

COTTONSEED MEAL POISONING.

Project: Study of the toxicity of cottonseed meal, effect of different treatments such as heating, boiling, soaking with different solvents, etc., on the toxicity of the meal; comparison of different meals and seeds in regard to the toxic principle.

This project is carried on in co-operation with the Department of Animal Pathology and practically all the work is being done by the animal pathologist, an outline of which is given in his report.

PUBLICATIONS DURING 1915.

Effect of Temperature on Glomerella. Phytopathology 5:247-259. A New Method of Selecting Tomatoes for Resistance to the Wilt Disease. Science, N. S. 42:914-915. Potato Scab. Louisiana Extension Circular No. 8. Seed Bed Sanitation. Louisiana Extension Circular No. 9.

HORTICULTURAL DEPARTMENT

GEO. L. TIEBOUT.

The time of the horticulturist is equally divided between truck extension work and experiment station activities. Investigations and demonstrations in the production and marketing of new truck crops have been continued. Brussells sprouts, winter cauliflower, broccoli, and bell pepers have received special attention in a commercial way.

Project 1. Production and marketing of Brussells sprouts.

Brussells sprouts are a new truck crop which we are investigating with the hope of establishing them as a new winter truck crop. We feel that our investigations in the culture and marketing of this crop have progressed sufficiently to warrant the advocacy of modest planting by truckers in established trucking centers where the Brussels sprouts can be loaded in refrigerator cars with other vegetables, such as cauliflower and bunched crops. The best variety appears to be the Long Island dwarf, from seed on Long Island, New York. The culture is similar to that of winter cauliflower. Harvesting begins in December and lasts through February. After the sprouts are trimmed and graded, they are packed in sugar barrels with crushed ice for shipment by express to distant markets. Hampers with crushed ice are used for nearby markets. The 24-quart berry carrier is the ideal package to use where general refrigeration is available, as sprouts are offered for sale in the retail markets in quart containers. The prices received to date have been very satisfactory and we feel that the crop will be quite remunerative. Details of culture, harvesting and marketing will be given in bulletin form at the end of the present season.

Project 2. Production and Marketing of Cauliflower.

Investigations in the growing, packing and marketing of cauliflower have been continued along the usual lines planned to meet the problems of growers in the commercial production of winter cauliflower. The demonstrations on alluvial land at the Sugar Experiment Station were completely destroyed by the September tornado which also wiped out hundreds of acres among cauliflower growers in Southern Louisiana.

Project 3. Trials of Broccoli as a supplemental winter crop.

Broccoli is a variety of cauliflower that is hardier than the snowball. While the curd or head is not as compact as that of the snowball type, we hope by adopting certain varieties of broccoli to extend the marketing season of winter cauliflower over four to five months instead of two or three, as in the case with the snowball sorts at present. We have imported broccoli seed from England and France during the past year. The various varieties planted in August have not been affected by cold this winter and are making a very luxuriant growth, and it appears that the results will warrant increased attention to this crop.

Project No. 4. Commercial production and marketing of bell peppers.

Activities in the commercial production and shipping of bell peppers as a summer truck crop have been continued. Our findings indicate that bell peppers should be grown in sufficient quantities to load refrigerator cars instead of shipping by local express. During June and July when most of the Louisiana peppers are marketed the weather is frequqently very warm even in the North and the peppers arrive in bad condition without refrigeration. In our investigations, peppers loaded in refrigerator cars for Chicago brought remunerative prices at the end of the season after shipments by local express had to be abandoned on account of losses sustained through bad conditions on arrival.

DEPARTMENT OF ANIMAL PATHOLOGY

HARRY MORRIS.

The work in the Department of Animal Pathology has been continued along the same lines as in previous years. Some of the common animal diseases have been studied and the work has been strictly research.

ANTHRAX.

Anthrax or charbon is one of the most common diseases of live stock in certain sections of the state and usually appears during the warm months of summer. In past years a general study of the disease has been made and some of the common carriers investigated. During 1915 a special study was made of the blood-sucking insects as carriers or disseminators of the disease. Some of the most common flies and mosquitoes were studied with the following results. By using the interrupted method of feeding anthrax was transmitted from infected guinea pigs to healthy ones through the biting of horn flies. The same results were obtained with some of the larger blood-sucking flies.

Anthrax was transmitted from infected animals to healthy ones through the biting of swamp mosquitoes. Several varieties were tested with equal number of transmissions from each.

In all insects tested the transmissions were mechanical as the microorganisms were carried from the infected host to the healthy animal on the proboscis of the insect.

A great many important points remain to be worked out so the subject will be continued along the same lines during the coming year.

By observing strict sanitary laws and the continued use of commercial vaccines the station has passed another year without the loss of a single animal from anthrax. Although anthrax has appeared annually on adjoining farms, the station has not lost an animal from the disease during the past four years.

Bulletin 152 on Anthrax or Charbon was published during 1915.

COTTONSEED MEAL POISONING.

The study of the problem of cottonseed meal poisoning has been continued. Methods for the reduction of toxicity of the meal have been studied. There is a great variation in the toxicity of cottonseed meal and some difficulty was experienced in obtaining meal of sufficient toxicity to produce poisoning in hogs.

In one test twenty hogs were fed large quantities of meal daily for a period of more than one hundred days. They made good gains in weight but showed no symptoms of poisoning. This problem will be continued during the coming year.

DEPARTMENT OF ENTOMOLOGY

Project No. 1. Investigations in Insects Causing Damage to Stored Rice.

The nursery inspection work and the special calls on the time of the Entomologist, occasioned by the spread of the citrus canker disease has prevented uninterrupted prosecution of all entomological problems. However, Mr. E. S. Tucker, associate entomologist, has been able to devote a portion of his time to this work, and to prevent too much interruption of the progress of the observations planned, Mr. Ed Foster was employed for approximately one-half of his time to carry on investigations in New Orleans and at the Sugar Experiment Station at Audubon Park.

The September storm destroyed a considerable portion of the material under observation and interrupted some of the breeding work; otherwise, satisfactory progress has been made on this line of investigation considering the amount of time and money spent on it.

Project No. 2. Corn Root Worm Investigation.

Very little progress has been made in the study of the points of interest on the life history, parasites, or conditions influencing the development of this very serious corn pest. The damage in regions near the experiment station was slight and no good opportunities were offered for any extended observations.

MECHANICAL ENGINEERING DEPARTMENT

E. W. Kerr.

BAGASSE EXPERIMENTS.

During the first part of the year, the results of boiler tests, etc., were worked up and tabulated. These tests were made during the 1914 season at Adeline, Vermilion and Angola sugar factories. A paper entitled ''Bagasse Burning'' read by the writer before the Louisiana Planters' Association, April, 1915, embodied the principal results of these tests. Special flue gas analyses were made at Adeline in December for the purpose of determining to what extent, if any, there is in distillation instead of combustion in bagasse furnaces, also the conditions necessary to prevent distillation.

EVAPORATOR EXPERIMENTS.

Under this head three lines of experiments have been carried on during the past season:

1. Test of quadruple effect, vacuum pans and juice heater (made over) at Adeline for the purpose of completing heat balance work done in previous years.

2. Heating juice with vapors from different bodies of evaporators. A single tube heater was constructed during the summer and operated in connection with the single effect evaporator in the laboratory. Tests were made on this heater to determine the effect of juice velocity, density of vapors, and air in vapors on

heat transmission. Vapor heaters were also installed in connection with each body of the double effect at Audubon Park. Tests were made on this apparatus to determine the effect of juice velocity, vapor density and method of venting the steam compartment of the heaters on heat transmission. Other tests were made on the full sized juice heater using vapors from the first body of a quadruple effect at Central Florida, Cuba.

3. Air in Condensers: Tests were made at Adeline and Stirling factories to determine the quantity of air and other incondensible gases handled by the condensors and air pumps. In these tests, such data as would make possible the calculations of the partial pressures of steam and air in the vapor pipes from evaporators and vacuum pans, also in suction pipes to vacuum pumps, including temperatures and pressures, were taken. Data of a similar nature was secured at Florida from a new type of condensing apparatus using rotary air pumps.

Many of the results obtained in the work outlined above have been given in articles printed in El Mundo, The Louisiana Planter and Sugar Manufacturer.

STATION No. 3, NORTH LOUISIANA STATION

J. B. Garrett, Assistant Director.

The work of this station during the past year has been conducted along the same general lines that have been followed for several years under the following main projects:

Project. Three year rotation experiment.

This experiment was originally planned in 1889 and continued without modification until 1908, when the plots were subdivided so as to give half of each plot the benefit of additional compost and commercial fertilizer previously added to the fertilizer plots, and to allow half the fertilizer plots to lapse to the same condition as originally planned for the unfertilized plots, with the general result that the yields in areas receiving compost have rapidly increased and the area to which compost had been added from 1889 to 1908 are showing evidence of rapid depletion of the accumulated fertilizer during that time.

Project. Raw rock phosphate test, as compared to acid phosphate in a three year rotation.

In this experiment, one-third of a field is devoted to corn and cow peas, one-third to crimson clover followed by velvet beans, and one-third to cotton. The velvet beans are turned under in the fall with rock phosphate at the rate of 2,700 pounds per acre once in three years. This application is made on one-half of each area, and 300 pounds of acid phosphate is applied to the corn and cotton crops in the rotation. The general result has indicated that the rock phosphate with the velvet bean crop is slightly inferior to acid phosphate in the production of both corn and cotton.

Project. Variety tests of corn.

Of the twenty selected varieties of corn for test the past year, the results have again shown that the southern strains of corn are superior to all others, and those standing at the top of the list are varieties that have been selected for a number of years in Louisiana, emphasizing again the value of giving attention to the development of our local varieties of corn.

Project. Cotton variety tests.

Of the twenty-four varieties of cotton carried in this test all of the largest yielding varieties are among the fairly well known ones that are raised in North Louisiana by the farmers. A few new varieties extensively advertised have given very poor results.

Projects. Thinning cotton to different stands, and at different times.

Since the issuance of a bulletin by Dr. O. F. Cook of the Bureau of Plant Industry, U. S. Dept. of Agriculture, advocating a method and time of thinning cotton radically different from that commonly practiced in Louisiana, the station undertook a series of experiments to test out the ideas advocated by Dr. Cook.

Forty-two experiments were carefully conducted, with the general result indicating that the time of thinning and the stand usually left on the fields at the Experiment Stations have given better results uniformly than cotton raised under the method given by the bulletin referred to above.

Project. Cotton fertilizer experiments.

While there have been some variations in the results of fertilizer tests, there has been less variation during the past year than is usually found in such work. Results have again emphasized the value of fertilizers bearing moderate quantities of nitrogen for cotton in the North Louisiana soils.

Project. Corn fertilizer experiments.

Thirty-nine tests were made of fertilizers of different composition and amounts applied, results generally indicating that cottonseed meal and acid phosphate continue to furnish our cheapest fertilizers for corn. Applications of potash fertilizer failed to show any pronounced value from this ingredient.

Project. Fertilizers for Spanish peanuts.

Twenty-nine tests were made in application of fertilizers to Spanish peanuts. As in previous years, we have failed to get any positive evidence that the peanut crop was benefited by the addition of as much as four hundred pounds of commercial fertilizer per acre; neither does the application of lime seem to materially increase the yield of Spanish peanuts on the soils of the Experiment Station.

Project. Fertilizers for Sudan grass.

This crop showed very marked response to the application of cottonseed meal, and cottonseed meal with the addition of acid phosphate, the largest yields being made with 315 pounds of equal parts cottonseed meal and acid phosphate. This amount of fertilizer trebled the yield over the plots having no fertilizer.

Project. Test of varieties of sweet potatoes.

The past year was especially favorable to sweet potatoes, the yield running over 300 bushels per acre from several of the varieties in the test, the Dooly Yam, Jersey Yellow and Southern Queen ranking among the highest yielding varieties.

Project. Test of fertilizer for sweet potatoes.

Twelve experiments in the application of various fertilizers to sweet potatoes again failed to show any very uniform results in the returns of fertilizers of different composition or of amounts, indicating that there are a number of variable factors that are not yet understood in the application of fertilizers to sweet potatoes.

Project. Cow pea variety tests.

Of the eighteen varieties of cow peas selected for comparative tests, including standard varieties and new introductions, none have been found that are superior to the comparatively well known varieties, particularly the Whippoorwill, the Groit, the New Era, and Brabham, which stand among the highest in our tests.

Project. Soy bean variety tests.

Of fourteen varieties of soy beans under trial, the yields varied from a little over three bushels to 20½ bushels per acre, the latter record being reached by the Hollybrook.

Project. Silage and soiling crop tests.

Of thirteen crops selected as being suitable for the production of silage, by far the heaviest tonnage was secured from the rank growing sorghums, particularly the Honey sorghum. The maximum yield secured being a little over 34 tons per acre on good red sandy loam soil, fertilized with 200 pounds of cottonseed meal and acid phosphate per acre.

Project. Pork production.

The past year has given us the largest return from the field crops grazed by hogs that we have ever secured. Corn and peas yielding 541 pounds per acre; Spanish peanuts, 408 pounds per acre; sweet potatoes, 898 pounds per acre. These results are part of a record secured in following out the rotations recommended in Circular No. 3.

Project. The growing and feeding of beef cattle.

During the past year a hundred ton stave silo was erected and filled with silage, mostly corn and soy beans, which has been used for wintering the cows and calves in our beef production experiments. With a moderate amount of silage we have been able to keep animals in first class condition at a comparatively small cost.

Project. The storage of sweet potatoes.

The sweet potato storage house is in operation again this year, where about 400 bushels of potatoes are properly housed. For the past two years this house has enabled us to keep sweet potatoes in good condition with very small loss. In the spring of 1915 we disposed of the 1914 crop at $1.00 per bushel and found a ready market for them.

HORTICULTURAL WORK.

The horticultural work has included a continuation of a large number of variety tests, fertilizer applications, production of seedling peaches, etc. Only the more important things need to be mentioned.

Four of the varieties of grapes to which a quarter acre had been planted gave a fairly good market crop the past year. They found a ready sale at Monroe and Shreveport at 4 cents to 5 cents per pound. The yield of these four varieties ranged from 1280 pounds to 1644 pounds per acre. Of the 70 varieties under test at the vineyard a number have produced yields at the rate of 3,000 or more pounds per acre, the Catawba giving a yield of 5,655 pounds.

Of the seedling peaches, three or four seedlings have been found that are worthy of propagation, and one that seems to have special merit. Samples of this seedling were sent to the pomologist of the U. S. Dept. of Agriculture at Washington the past season, and pronounced there as being of good quality and worthy of propagation. It is a vigorous growing peach of the Elberta type, and if the tree proves to be a durable one, it will probably be a valuable accession to North Louisiana.

The experiments previously outlined on the Magnolia fig have been practically a complete failure, as we have been unable to overcome the difficulties that seem to stand in the way of making this a commercial fig in that portion of the state.

The variety tests of Irish potatoes, and hill selections, have only confirmed results already published in bulletin form.

STATION NO. 4, RICE EXPERIMENT STATION

Crowley.

F. C. Quereau, Assistant Director.

This station is conducted as a joint enterprise between Louisiana State University and the United States Department of Agriculture.

All of the experiments outlined in previous reports have been continued.

PHOSPHORUS EXPERIMENTS.

It may be stated in a general way that the soils in that section are in need of some form of *phosphorus* for the best development of rice and that under ordinary circumstances a high grade acid phosphate is most apt to meet this requirement. Two hundred pounds per acre is approximately the most favorable quantity to be used. For five years in succession this amount has produced the most profitable crops. A serious difficulty, however, to be contended in continuous cropping is that the application of acid phosphate accelerates growth of grasses and weeds until these field pests become a menace to the crop. However, it emphasizes the necessity for some form of rotation that will help keep these weeds suppressed. On all of the experiments where phosphate has been used as a fertilizer, the application had been made broadcast. There is some evidence that if phosphorus were applied in the drill the difficulty encountered with weeds and grasses would be somewhat diminished. However, this is yet to be more fully tested before any conclusions are reached.

The potash experiments do not yet indicate that the yield of rice is appreciably increased by the application of potash salts. As we have not yet been able to construct a small rice mill for milling tests, we are still unable to determine with positiveness what may be the effect on the milling quality of rice resulting from the application of potash.

In the nitrogen experiments, it seems evident that readily available forms of nitrogen are superior to organic forms of nitrogen when applied to Honduras rice, but the results are not conspicuously different when different forms of nitrogen are used on the late maturing varieties.

Straight Head in Rice. This disease or condition seems to occur in land containing an abundance of vegetable matter. Rice grown on land previously planted to some highland crop is most likely to be affected. It is not definitely known whether this is caused by a disease or is due to certain physical conditions caused by the decay of vegetable matter in the soil under flooding conditions. The only known preventive is to delay initial irrigation as long as possible, or, if it is necessary to irrigate because of weeds or grass, to drain about fifteen days from the time of first flooding and allow the land to become dry. This in the greater number of cases seems to largely prevent ''straight head'' condition.

Root Maggot (Lissorphopterus symplex).

Experiments seem to indicate that from 15 to 30 gallons of crude oil per acre applied to the irrigation water when the rice is first flooded will in a large measure prevent the work of the maggot.

Crop Rotations. There are two two-year rotations, one three-year rotation and one four-year rotation. All rotations commenced in 1910 have been continued.

In 1915 the rice yield on these plots averaged 17.6 barrels per acre, the corn (injured by July storm), 12 bushels; oats, 30 bushels. The check plot planted continuously in rice made 2.18 barrels per acre of pure red rice. It is believed that rotations which include rice and highland crops should be as long as possible. In these experiments (with fertilizers on rice) five profitable crops of rice have been grown in succession on land which was considered "worn out." It, therefore, seems reasonable to believe that six or seven crops of rice might be grown on land that is in a high state of fertility due to the growing of highland crops in long rotation. By means of long rotation, therefore, the overhead expense of levees in the one case and drainage ditches on the other would be met.

Miscellaneous Crops. The usual number of crops were grown on the station during 1915.

A Mungo bean seems to be a plant of considerable promise. This bean made a heavier growth of vine than any other legume grown on the station. However, the yield of grain was small. Further experiments will be conducted with it during 1916.

Garlic is also a crop which seems to do very well on rice soils.

Japanese cane was grown for the first time. The yield was small, due to prolonged drouth. It is believed, however, to be a very promising crop for the rice farm.

The United States Department of Agriculture has been devoting primary attention to the introduction of new varieties of rice secured from different parts of the world for trial here. They have secured some strains that are undoubtedly superior in some respects to any strains previously grown in Louisiana, and it is likely that some of these will have a combination of desirable characters that will make them popular throughout the state. Small quantities of a number of these most promising strains have been distributed to rice planters throughout the state for field trials. Mr. C. E. Chambliss and Mr. J. M. Jenkins, who have charge of this work for the Department, have now collected something like twenty-five hundred varieties of rices from all parts of the world, and are making a thoroughly technical study of them, as well as testing their adaptability to conditions in Louisiana. A full report of their work will be issued in due time by the United States Department of Agriculture.

93 N
.3

TWENTY-NINTH ANNUAL REPORT

OF THE

State College
of Washington
Library

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

---

FOR 1916

TO THE GOVERNOR

By **W. R. DODSON**, Director

The Ortlieb Printing House, Inc.,
Baton Rouge, La.
1917

Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO.

GOVERNOR RUFFIN G. PLEASANT, President.
I. D. WALL, Vice President Board of Supervisors.
HARRY D. WILSON, Commissioner of Agriculture and Immigration.
THOS. D. BOYD, President State University.
W. R. DODSON, Director Experiment Station.

STATION STAFF.

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
A. P. KERR, M. S., Assistant Director, Baton Rouge.
C. E. HESTER, B. S., Assistant Director, Calhoun.
F. C. QUEREAU, M. S., Assistant Director, Crowley.
W. H. DALRYMPLE, M. R. C. V. S.. Viçe Director and Veterinarian, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Assistant Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
W. R. GRIFFING, B. S., Assistant Plant Pathologist, Baton Rouge.
F. V. EMERSON, Ph. D., in charge of Soil Survey Work, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
J. B. GARRETT, B. S., Entomologist Baton Rouge.
W. L. OWEN, B. S., Bacteriologist, Audubon Park, New Orleans.
M. A. SCHNELLER, Ph. D., Chemist, Audubon Park, New Orleans.
G. D. CAIN, B. S., Chemist, in charge of Fertilizer and Feedstuffs Laboratory, Baton Rouge.
J. M. JENNINGS, M. S., Assistant Chemist, Baton Rouge.
S. BYALL, B. S., Assistant Chemist, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
W. P. DENSON, B. S., Assistant Chemist, Baton Rouge.
J. H. JOLLY, B. S., Assistant Chemist, Baton Rouge.
ROBT. G. SCOTT, B. S., Assistant Chemist, Baton Rouge.
I. SELECTER, M. S., Soil Chemist, Baton Rouge.
MISS MAYME DWORAK, M. A., Scientific Assistant in charge of Seed Laboratory, detailed by United States Department of Agriculture, Baton Rouge.
MRS. EDITH STRONG, Secretary to the Director, Baton Rouge.
J. K. McHUGH, Clerk and Stenographer, Audubon Park, New Orleans.
R. P. SWIRE, A. B., Treasurer, Baton Rouge.
C. B. ANDERS, B. S., Assistant Animal Husbandman, Baton Rouge.
R. C. CALLOWAY, B. S., in charge of Dairy, Baton Rouge.
C. J. BARRILLEAUX, Farm Manager, Audubon Park, New Orleans.
J. A. WEDGEWORTH, Mailing Secretary, Baton Rouge.

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE,
OFFICE OF EXPERIMENT STATIONS,

Baton Rouge, January, 1917.

To His Excellency, Ruffin G. Pleasant,
Governor of Louisiana:

Sir—I am pleased to submit herewith the annual report of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the year 1916. As required by act of the National Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional federal funds for research work at the experiment stations of the several states, a financial statement is submitted for the year beginning July 1, 1915, and ending June 30, 1916.

FINANCIAL STATEMENT.

The state appropriation for the experiment stations is kept in a separate account from that of the federal funds, as will be shown by the complete financial statement submitted herewith.

HATCH AND ADAMS FUNDS.

Dr.	Hatch Fund.	Adams Fund.
To receipt from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1916, under Acts of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By salaries	8,951.45	12,718.35
Labor	2,657.54	370.07
Publications	266.51	......
Postage and stationery	52.26	49.30
Freight and express	4.59	36.64
Heat, water and light	20.47	284.44
Chemicals	44.43	165.63
Seeds and sundries	353.91	196.70
Fertilizers	89.37	10.00
Feeding stuffs	1,368.58	121.95
Library	378.12	89.09
Tools and implements	112.37	131.42
Furniture and fixtures	3.57	118.25
Scientific apparatus	160.92	253.70
Traveling expenses	4.56	306.32
Contingent expense	20.00	......
Building and repairs	511.35	148.14
	$15,000.00	$15,000.00

STATE FUND.

(Dec. 1, 1915, to November 30, 1916.)

Receipts:		
Received from State Treasurer	$23,458.34	
Miscellaneous sales	4,016.97	
Refunds	1,390.96	
Interest on daily balance	46.74	
Deficit, Nov. 30, 1916	3,310.96	
		$32,123.97

Expenditures:

Salaries	$9,904.20	
Labor	5,273.24	
Postage and stationery	534.57	
Freight and express	567.88	
Heat, water and light	329.74	
Chemical supplies	22.63	
Seeds and sundry supplies	2,120.73	
Fertilizer	526.73	
Feedstuffs	1,323.04	
Library	33.00	
Tools, implements and machinery	751.04	
Furniture and fixtures	303.76	
Livestock	1,523.40	
Traveling expenses	1,483.96	
Contingent expense	1,728.55	
Building and repairs	4,401.41	
Deficit, Dec. 1, 1915	2,132.69	
		$32,123.97

FERTILIZER AND FEEDSTUFFS FUND.

Receipts:

Cash on hand, Dec. 1, 1915	$2,171.88	
Miscellaneous sales	3.00	
Refunds	91.31	
Commissioner of Agriculture	11,000.00	
Deficit, Nov. 30, 1916	419.05	
		$13,685.24

Expenditures:

Salaries	$7,399.44	
Labor	1,017.75	
Postage and stationery	205.80	
Freight and express	86.23	
Heat, water and light	1,101.60	
Chemicals	631.88	
Seeds and sundry supplies	347.22	
Scientific apparatus	942.70	
Traveling expense	353.50	
Furniture and fixtures	218.38	
Tools, implements and machinery	75.50	
Livestock	1,234.80	
Building and repairs	1,234.80	
		$13,685.24

ADMINISTRATION.

There have been no important changes in the personnel of the staff during the past year. For three months during the summer the Assistant Director of the Rice Station was on leave of absence, having been called to service with the National Guards.

I have continued to act as Dean of the College of Agriculture and Director of Agricultural Extension Work, as well as Director of the Stations, and have also served as a member of the committee of three directing officials for the Live Stock Extension Service conducted by the United States Department of Agriculture in co-operation with Louisiana State University.

SHORT COURSES AND AGRICULTURAL FAIRS.

As a result of increased funds for extension work, the extension staff has been increased to an extent that renders it unnecessary for the members of the Station staff to attend short courses and to act as judges for agricultural fairs. This greatly facilitates the work of the stations.

FERTILIZER AND FEEDSTUFFS LABORATORY.

The laboratory has continued to analyze samples of fertilizer and feedstuffs for the State Board of Agriculture and Immigration. The General Assembly of 1916 passed a law to replace previous laws enacted for the control of the sale of feed stuffs and fertilizers. The law states that the Director of Experiment Stations shall be State Chemist, instead of Official Chemist as heretofore. The inspection department was modified so as give greater efficiency in both departments of this work.

In connection with the fertilizer and feed stuffs laboratory, a soil and miscellaneous laboratory has been established and is making good progress in systematizing analytical work on the soil types of the State, as a part of general soil survey.

STATION NO. 1—SUGAR EXPERIMENT STATION,

Audubon Park, New Orleans.

W. G. TAGGART, Assistant Director.

FIELD WORK.

The field work at the Sugar Experiment Station during the year was largely a continuation of the work carried on during the previous year.

FERTILIZER EXPERIMENTS.

Results from potash in the form of sulphate, when applied to first-year stubble, were in line with those obtained last year from plant cane, and average increase from triplicate experiments being 3.03 tons of cane. This is contradictory to many other experiments in previous years.

Results from a comparative test of newer nitrogenous materials again shows calcium cyanamid to rank third in order. The urgency of combining some of the work done in the last few years into new experiments suggests the necessity of discontinuing this experiment. Calcium nitrate does not yet seem to be on the market as a fertilizer and its use at this station has been discontinued.

The experiment with varying quantities of phosphoric acid, together with a constant ration of nitrogen, was carried on second-year stubble. Five hundred pounds of acid phosphate used with five hundred pounds of tankage gave an increase over two hundred and fifty pounds of acid phosphate and five hundred pounds of tankage, which a little more than paid for the extra amount of plant food. The failure of this experiment to yield tonnage equal to that obtained during the past four years could be explained by a deficit in the nitrogen balance, caused by continuously growing sugar cane on land for three years, though more likely second-year stubble is not thrifty enough to use profitably the large amount of plant food which was added.

VARIETIES AND SEEDLINGS.

Four foreign varieties of sugar cane were received and added to the collection; two known to produce unusually large tonnage in various countries; one said to be resistant to the cane borer and one resistant to disease. Due to unsuitable greenhouse conditions, no Louisiana seedlings were obtained during the year. The Louisiana seedlings L511 and L231 came up to the high standard expected of them, both at this station and on some of the plantations where they have been placed for trial. Twenty-seven packages of these varieties, together with some L218, L219, L253, and L454, were sent out by request of sugar planters. Requests for shipments to be made in 1917 are already being received and filed.

CORN.

The work of developing a white flint corn was continued. This variety was planted on clover fallow, and though injured by heavy winds, produced as much as sixty-three bushels per acre.

Experiments as to the time of applying fertilizer to corn were temporarily abandoned in order to use the plot for variety tests of sugar cane.

Those so-called prolific varieties of corn that are recommended by the Experiment Stations of other southern states in this latitude were obtained and tested against native Yellow Creole, and it was found that none of them gave superior yields.

All other experiments with corn (Fertilizers) were continued, and no feature not already reported was developed.

FORAGE AND HAY.

Alfalfa was again grown successfully as an annual.

An attempt to increase the value of hay grown on Johnson grass infested lands, by growing clover on them, was made. The one year's work indicates that red clover especially can be successfully grown and two cuttings of clean clover made before the Johnson grass gets headway, but that the earlier growing period allows clover to finish its growth too early to enable the cutting of a mixed Johnson grass-clover hay.

Observations on the eradication of Johnson grass by kudzu were continued. There seems to be no question but that this plant will completely choke out the grass in a very few years.

FIELD DAY.

The ninth annual field day of the Louisiana Sugar Planters' Association was held on the station grounds on June 8th, with a very large attendance of all classes of men interested in the development of the sugar industry.

ENTOMOLOGICAL WORK.

The Bureau of Entomology of the United States Department of Agriculture maintains an office at Audubon Park for the investigation of sugar cane insects, especially the sugar cane borer. The life history of this insect has been thoroughly studied, the territory in which it occurs has been mapped out, and the damage due to it has been carefully estimated. Various experiments have been conducted both at the Experiment Station and on plantations, relating to improved methods of control. Some of these are very promising and with the accumulation of additional data some new agricultural practices may be recommended. The introduction from Cuba of parasites of the borer was started in 1915 and was discontinued on account of lack of funds, but will again be taken up in 1917. Two men will be sent to Cuba, where they will search for the parasites and send them to the Experiment Station. It is hoped ultimately to distribute them throughout the sugar belt.

Another pest of sugar cane is the mealy bug, which is being studied in a similar way. A lady beetle which attacks this species has been obtained from California and is being reared for distribution to the plantations. The control of the Argentine ant in sugar cane fields is also being studied.

RESEARCH CHEMICAL DEPARTMENT.

In 1915 it had been shown that the dark coloring matter of cane juices is mainly due to iron compounds of

(a) Natural tannin bodies of the cane,
(b) Decomposition products of glucose.

The investigation was continued along this line and the preliminary results published in Bulletin 157, 1916, "The Coloring Matter of Cane Juices." The conclusions therein reached are as follows:

(1) The eyes and tops of sugar cane contain polyphenols which pass into the juice.

(2) Traces of iron are sufficient for the production of a very dark color in such juices.

(3) Reducing agents, such as sulphur dioxide and hydrosulfites are only temporary remedies. The dark color returns on oxidation or cooling of juices and syrups.

(4) The dark shade of plantation white sugars, increasing in storage, is due to traces of phenol iron compound.

(5) A permanently light colored juice may be obtained by:

(a) Complete elimination of all traces of iron and complete avoidance of contact of liquors with iron during further stages of manufacture.
(b) Elimination of polyphenols by boneblack, vegetable charcoal, etc.

(6) The polyphenol content of juices could be reduced by topping the cane low, using tops for planting. This would result in a distinct improvement of the color of the juices.

A method of clarification was suggested, based on the principle of iron elimination (5a) by sodium aluminate combined with subsequent working in **copper** evaporators. A trial given this method in the Station sugar house, which has an all **iron** equipment, could not produce the intended results. On the contrary, the white sugar produced possessed to a higher degree the fault of plantation white sugars, i. e., darkening in storage, for alkali decomposition products had been formed which, like the natural tannin bodies, produce black iron compounds. This experiment, therefore, rather demonstrated the necessity of working at distinct acidity, if iron evaporators as usual are used.

We also had the opportunity of seeing demonstrated here one of the clarifying agents mentioned under (5b), a vegetable decolorizing carbon, Norit. This, like a similar preparation, Eponit, possesses to a much higher degree than boneblack the power to absorb the objectionable tannin bodies. The high cost, however, seems to stand in the way of their general use in the sugar house. Their manufacture is a trade secret, and this department is engaged in an investigation on the decolorizing power of carbons.

Project 2. The analytical problem of direct sucrose determination in the presence of reducing sugars by destroying the rotary power of the latter by heating with alkali, was continued, and the results thus far obtained published in Bulletin 156 (July, 1916).

Since then a means was found to reduce the objectionable small residual rotation of reducing sugar to 00 by the use of lead alkali solutions. This method yields quite satisfactory results with artificial mixtures of sucrose and invert sugar. In fact, on invert sugar syrups the results are more accurate than those of the Clerget inversion method, which shows an apparent sucrose content where secondary condensation products of fructose are really present. The application of this new modification to sugar house products has not been satisfactory, and this work is to be continued.

BACTERIOLOGICAL DEPARTMENT.

WM. L. OWEN.

Project No. 1.—A Study of the Deterioration of Sugars and of Principal Factors Affecting Same.

This project has been continued throughout the past year, and as the major project of the department has commanded the greater portion of the bacteriologist's time.

A number of samples of sugars were again collected from plantations throughout the State. These were divided into triplicate portions, two of which were inoculated and the third kept as a control, and the three samples stored at room temperature and kept under observation for twelve months. Only ten per cent of the inoculated samples showed a greater deterioration than the controls. These results indicate that the original infection of the majority of these samples was sufficient to cause their deterioration when suitable conditions for this action obtained. Sixty-six per cent of the samples were safe for storage according to the factor. Of these apparently safe sugars for storage, one-third deteriorated, which was a much higher percentage than for the previous year. This was most probably due to the fact that small quantities of water were added to all sugars, either as inoculating fluids, or as sterile distilled water in the case of the controls. Of the sugars regarded as unsafe according to the factor, 42 per cent did not deteriorate. Of the sugar samples which were regarded as safe for storage as judged by the factor, and subsequently deteriorated, 84 per cent had absorbed some atmospheric moisture.

Experiments were conducted to determine the relative rate of deterioration of a sugar with varying amounts of absorbed moisture. A sugar was selected and allowed to absorb varying amounts of moisture, giving a series with moisture contents varying from .4 to 2.33 per cent, with factors of safety varying from .177 to .594, respectively. In this series deterioration only occurred in those samples having a factor higher than .250. The deterioration of the samples with a factor of .301 was 1.45 per cent.

In order to determine the relations between the rate of deterioration of a sugar and the density of the films of molasses surrounding its crystals, special experiments were made upon the keeping quality of laboratory-made sugar with molasses films of known composition. A series of sugars were made from standard granulated sugar crystals, and varying proportions of final molasses and a standard granulated sugar syrup. The series of sugars thus obtained had factors of safety varying from .136 to .677 with molasses films varying in density from 69 to 79 Brix. The deterioration of these samples during three months' storage was 0.7 per cent on the sugar with a factor of .677, 0.6 per cent on the sugar with a factor of .369, and 1.42 per cent on the one with a factor of .472. The unexpectedly small deterioration on the sugar with a factor of .677, which would ordinarily be considered very unsafe, was probably due to the lack of certain impurities usually present in plantation granulated sugar, which was supplied in neither the standard granulated sugar crystals, nor in the water with which the white sugar syrup was made. Experiments upon the influence of cold storage upon the keeping of sugars, showed that the rate of deterioration of samples stored at 200 C, was only 5 per cent as rapid as the same samples stored at 340 C. As the samples in both cases contained over 3 per cent of moisture, the moisture was not the limiting factor in the experiment. These experiments suggest the possible utilization of cold storage for the warehousing of our white sugar in this climate.

Project No. 2.—Study of the Species of Micro-organisms Causing the Deterioration of Sugar.

This project, in conjunction with the preceding one, has constituted the principal investigations of this department during the past year. The work on this project has consisted in the following series of experiments, viz. (1) The relative deteriorative powers of the various species of micro-organism, when acting singly or in mixed cultures; (2) The maximum densities within which these species retain their deteriorative power; (3) The minimum nutrient requirements of the various species of micro-organism occurring in sugars; (4) The acquisition of deteriorative power by the same species as those found in sugars when isolated from sources other than sugars or sugar products, when grown for successive generations in sugar solutions.

Experiments upon the relative deteriorative powers of the eighteen bacterial cultures that had been isolated from sugars, and sugar products, show some cultures to have as much as four times the deteriorative power of certain others. Only two of the twenty torula-cultures showed any sucrose inverting power, and this was very slight as compared with the action of the bacterial species.

While the most active inverting torula species only caused a loss of 15 per cent of sucrose in a 50 per cent sucrose solution during a month's incubation, the bacterial culture caused a loss of 40 per cent in the same solution within one-half the time. Mixed inoculations of torula and bacteria invariably resulted in a deterioration greater than that produced by the torula, and much less than where pure cultures of bacteria were introduced alone. No symbiotic relationship between the two is therefore indicated in the results of these experiments.

The maximum limit of density of the bacterial cultures was found to be between 60 and 72 Brix, while no limit has yet been found for the activity of the torula in fermenting invert sugar. Above 65 Brix the action of the torula upon sugar solutions containing both sucrose and invert sugar is exclusively confined to the latter, thus explaining the decrease in invert sugar during the storage of sugars with low factors of safety. The bacterial species associated with the deterioration of sugars have a very low minimum nutrient requirement. Standard granulated sugar and distilled water in a 35 per cent solution, showed a loss of sucrose 2.69 per cent when inoculated with cultures of deteriorative bacteria. Plantation granulated sugar showed a loss of 2.9 per cent under the same condition. The addition of 1cc of a 1:1000 molasses solution to 100 cc of the standard granulated sugar solution gave a deterioration of 2.8 per cent, while the same addition to the plantation granulated resulted in a deterioration of 4.9 per cent. The addition of 1cc of a 1:1000 dirt suspension caused a deterioration of plantation granulated of 8.3 per cent. These experiments emphasize the importance of cleanliness in the manufacture of white sugar of keeping qualities.

Experiments upon the acquisition of deteriorative power by the same species of bacteria as those found in sugars, but isolated from sources other than sugar or sugar products, showed the following: A culture obtained from the Museum of Natural History, New York City, showed an increase in deteriorative power of about 1100 per cent when grown for successive generations in sugar solution. This would indicate that the most active infection of sugar comes from old sources of contamination in the house, rather than from the dirt immediately introduced into the juice from the soil adhering to the cane.

Project No. 3.—A study of the Persistence of Sugar Deteriorative Micro-organisms throughout the Successive Stages of Sugar Manufacture, with Special Reference to the Source of Infection of Sugars.

This investigation was formerly included as a part of the preceding one, but owing to its continuallly broadening scope, has recently been made a distinct project. The investigation, which was instituted a year ago, was continued during the operation of the Experment Station sugar house the past season. Comparative tests were made of the relative effectiveness of the plate and frame filter press, the Sweetland, and the bag filter, in eliminating the micro-organisms from sugar products. Experiments were made upon the retention by unwashed sugars, of the micro-organisms contained in their respective massecuities. In these experiments it was found that on an average 13 per cent of the micro-organisms of the massecuite was retained by the sugar crystals. Washing reduced their number by approximately one-half.

Project No. 4.—A Study of the Micro-organisms Associated with the Various Spontaneous Fermentations which Cane Juice Undergoes.

Owing to the large amount of time which the foregoing projects have demanded this project has received but little attention. Many interesting cultures have been isolated, however, and preliminary experiments made upon their action in pure cultures upon cane juices.

Project No. 5.—A Study of the Causes and Means for Preventing the Fermentation of Cane Table Syrup.

Although this project has been under contemplation for a long time, it has only been recently that it has appeared possible to find the time to give it the attention that its importance warrants. A number of samples have been collected through the courtesy of the Penick & Ford Company, of New Orleans, and it is to be hoped that much progress can be made upon it during the present year. The work of the department has been greatly facilitated by the cordial co-operation of the planters in donating sugar samples. The thanks of the bacteriologist are especially due the management of the Ashland Sugar Factory, from whom we obtained comparatively large quantities of white sugar, and white sugar syrup. Also the management of Reserve and the Wilbert Company for white sugar syrup. Thanks are also due the Penick & Ford Company for donation of syrup samples, and to the American Sugar Refining Company, who kindly donated a large quantity of coarse granulated sugar for our laboratory experiments.

STATION NO. 2, BATON ROUGE.

A. P. KERR, Assistant Director.

The work of this station has been carried on with most of the previously planned projects and the addition of a few new ones where more information along certain field and animal industry work was necessary at this time. To meet the requirements of these additional projects it was necessary to rent one hundred acres of land adjoining the station.

The silage production test has been carried on as previously outlined. Corn and soy beans seem to be our best silage crops. Japanese cane produces a large tonnage, but the quality of silage is not first class and harvesting must be done by hand. This greatly increases the cost of production over that of corn and soy beans.

An effort was also made to determine the value of Japanese cane as a grazing crop for steers, the idea being to carry them through the winter for early spring feeding. Although the fall and winter was very cold and wet nearly the entire season, twenty steers were practically maintained on Japanese cane for sixty days.

The production of pork in the four-year rotation—corn and cowpeas, soy beans, sweet potatoes, and stock beets—confirm the results of previous years, as follows: One bushel of corn produces from 12 to 16 pounds of pork, depending a great deal on the crop of peas in the corn. And 2½ to 3 bushels of sweet potatoes are about equal in feeding value to 1 bushel of corn. The beets in this rotation are used entirely as a maintenance ration. The yield of soy beans is so variable it is impossible to draw accurate conclusion as to the amount of pork per acre that can be produced. This crop is a very important one in the rotation, however, as it is ready to graze between the end of the corn and peas and the sweet potatoes. It being a legume also helps to maintain the soil fertility.

CORN EXPERIMENT.

Commercial fertilizer applied at different times to corn seems to show that it makes very little difference whether it is applied before planting or during cultivation.

On the plots where commercial fertilizer has been used alone continuously for the past twenty-two years, the average yield of corn is around 16 bushels per acre. The plots where the same amount of commercial fertilizer is used in connection with a crop of clover and stable manure the yield of corn is 60 to 70 bushels per acre, showing the intelligent way of using commercial fertilizer.

The tests of varieties of corn were carried on the same as usual, using those varieties that were the most popular in the state. This is possibly the only method of eliminating those varieties that are not desirable from the standpoint of production and keeping qualities.

The selection plot of corn has been continued for seed for use at the station.

The two-year rotation with corn, cotton, oats and clover is still in progress. This particular kind of field tests requires the average of a great number of results to be able to draw any conclusion whatever.

HOG CROP.

A new project was inaugurated during the year to determine the effects of different grazing crops, such as corn, soy beans, peanuts, and sweet potatoes, on the bodies of hogs. We expect to publish a preliminary report, giving one year's results, on this project some time during the coming year.

Alfalfa was planted during the fall as heretofore. The problem of getting this crop to remain growing during the summer here is yet unsolved.

Various new crops were tried as usual and those that seem to have any value for this section will be tried again next year.

DEPARTMENT OF ANIMAL PATHOLOGY.

HARRY MORRIS.

The work in the Department of Animal Pathology has been a continuation of the projects which have been under investigation for several years. This includes a study of some of the most serious animal diseases in the state.

ANTHRAX.

Anthrax or charbon is one of the most common diseases of live stock in certain sections of the state. During 1916 the study of the common blood-sucking insects as carriers or disseminators of the disease has been continued. A special study has been made of the time element in which infection could be produced through the biting of flies and mosquitoes; also the carcasses of animals dead of anthrax as a possible source of infection. Special attention was given the subject of contamination of the fecal matter of insects after having fed upon anthrax blood. A report on this subject will be made in bulletin form.

During the past year there was a marked decrease in the loss from anthrax in this state. Fewer blood samples were examined in this laboratory than in past years. The decrease was due, no doubt, to the more strict observance on the part of farmers of the rules and regulations of the State Live Stock Sanitary Board and the continued use of anthrax vaccines.

COTTON SEED MEAL POISONING.

The study of the problem of cotton seed meal poisoning has been continued. The toxicity of cotton seed meal and its feeding value as compared to other so-called toxic feeds has been studied. The subject will be continued.

DEPARTMENT OF PLANT PATHOLOGY.

C. W. EDGERTON.

There was no change in the nature of the project from the previous year. During the year, however, two of the projects were completed and were discontinued after the results were published. The projects discontinued were the bean disease project, and the cotton boll rot project. The final results were published in Bulletin 155, and in an article of the October number, 1915, of Phytopathology.

The sugar cane disease project received considerable attention throughout the year. Data on the effect of the different diseases organisms on germination of cane are being obtained. The Red Rot fungus (**Colletotrichum Falcatum**) seems to be very very important in reducing the percentage of germination of the buds of the cane. Tests have been carried on for several years at New Orleans and at Baton Rouge and the results obtained agree quite closely. One more season's test will be made before results are published. An article published in the Sugar Planter during the year gave some of the results of the investigation.

The tomato wilt project has received more attention than any of the others. The investigation has included a study of the organism, its relation to other wilt organisms, the effect of the environment such as temperature on its development, the variation of pathogenicity of different strains and an attempt to produce wilt resistant strains and hybrids. A new method of selecting for wilt resistance has been worked out, which aids considerably in the work. The seed bed soil is first sterilized by steam and then inoculated with the tomato wilt organism. The wilt organism grows very rapidly under these conditions and young plants which develop in the soil will succumb before they are ready to transplant if they are susceptible to the disease. This method also enables us to test out the susceptibility of the different tomato varieties and also the pathogenicity of the different fungus strains very readily. This method was described in an article in Science, in December, 1915.

The eggplant disease project has also received considerable attention. The life history of the organism and the effect of different environmental factors, such as temperature, have been investigated.

The cotton wilt project has received some attention. The fact that fairly resistant strains can be obtained in a few years' time by careful selection has been demonstrated. The organism causing the disease has also been studied in comparison with the tomato wilt organism.

The projects on alfalfa diseases, Sclerotium wilt disease, and rice diseases were not pushed much during 1915-16. The work was limited to field observations.

WORK AT THE EXPERIMENT STATION DAIRY DURING 1916.

The work at the Experiment Station Dairy has consisted of growing and feeding different forage crops to the dairy cows to obtain results as to the best rotations to grow on the dairy farms of the State. The principal crops grown have been oats, corn, soy beans, sorghum, Japanese cane, turnips, carrots, stock beets and lespedeza hay. Oats and silage have been fed for the purpose of obtaining the comparative values of each for milk production. The results obtained were in favor of the oats, when the weather would permit the cattle to graze on them; however, it has been difficult to find a substitute for silage in the way of a succulent crop, for the reason that the continuous rains in the winter time will not permit the cattle to graze the oats and other forage crops.

After growing and feeding a number of silage crops, we have come to the conclusion that soy beans and corn make the best crops for silage, these two crops when planted together and at the same time, also harvested together, make a most excellent quality of silage.

The root crops grown have given very good results, and the stock beet has been found to be a good milk producer, and is possibly the best root for spring feeding, while the rutabaga is better for feeding during the winter

During the year five pure-bred Holstein cows were added to the herd, one pure-bred Holstein bull and a Jersey bull, both of exceptional value and backed by cows of high production

The purpose of keeping the two breeds is to conduct experiments to determine as near as possible which is the best suited to Louisiana conditions.

Twenty pure-bred heifer calves have been raised during the year which will soon add much to the production of the herd. A number of pure-bred bull calves have been raised and sold to Louisiana dairy farmers.

A recent annual test that was made of the herd for tuberculosis found the herd to be free of this disease, and they were also found to be free of any other contagious diseases.

A concrete silo of 130 tons capacity was constructed during the year which will give ample space for storing silage for the milch cows during the fall and winter months. A calf house that will accommodate 30 calves was constructed according to latest methods of building calf houses. This house is constructed so that the calves may be separated into groups for the purpose of conducting feeding experiments.

NORTH LOUISIANA STATION, NO. 3, CALHOUN.

C. E. HESTER, Assistant Director.

The work at the North Louisiana Station has been carried entirely on the state fund this year. The tests have been conducted along lines similar to that of previous years. Rotation experiments, variety and fertilizer experiments with crops suited to this section, pork, beef, fruit and silage experiments have all been continued. The experiments along trucking lines have been discontinued. Increased attention has been paid to pork production and to the enlarging of the pasturing facilities for the accommodation of the increasing herd of beef cattle.

RAW ROCK PHOSPHATE VS. ACID PHOSPHATE IN A THREE-YEAR ROTATION.

In this test one-third of the area is devoted to cotton. one-third to corn and cowpeas, one-third to crimson clover followed by velvet beans. The velvet bean vines are turned under in the fall with raw rock phosphate at the rate of 2,700 pounds per acre, thus each plot receives an application of raw rock phosphate every three years. The acid phosphate is applied to the cotton and corn every year at the rate of 300 pounds per acre. The acid phosphate gave a little higher yield of both cotton and corn than the raw rock phosphate.

The cotton thinning test has been continued with results tending to be slightly in favor of the old method of thinning.

The cotton and corn variety tests have been continued with the varieties that have been recommended by the station, leading most of the new ones tried. Of the new varieties that have been tried none of them seem to merit special mention.

The tests of corn fertilizers in different amounts have been continued along the same line as before. The gray sandy loam soils show the most need of nitrogenous fertilizer with the need of phosphorus standing next. The addition of kainit did not give any increase over the check plots.

The cowpea variety test verifies the results of previous years that the best varieties for that section are the Groit, Brabham, Whippoorwill, and New Era.

The sweet potato storage house that has been in operation for the past few years was operated again successfully this year. About 400 bushels of sweet potatoes were stored during the fall of 1915, and were kept in perfect condition until July, 1916, when they were disposed of. In order to compare this method of storing with the old way of banking them in the open, about 200 bushels were used and as usual a large per cent were lost from rot.

ANIMAL PRODUCTION.

The hog grazing experiment was carried out as usual with a three-year rotation of corn and cowpeas, peanuts and sweet potatoes.

The hundred-ton silo was filled with corn and soy beans. This silage was used for carrying cattle over the winter. An effort is being made to determine the cost of carrying cattle through the winter, using the available feed stuffs.

The work of grading up the common cattle with a shorthorn bull is getting along with very encouraging results.

HORTICULTURAL WORK.

The Bureau of Plant Industry, United States Department of Agriculture, supplied the station with several varieties of muscadine grapes which were set out in March, 1914. Three of these varieties, the Luola, Memory, and Smith, produced their first crop. They have an excellent flavor and promise to outclass the varieties now in the vineyard.

The work on selecting seedling peaches has been carried on this season by cutting out those that are no longer worthy of further propagation.

The apple crop was a complete failure on account of blight; also all of the pear trees have been destroyed with blight with the exception of the Wallace Keiffer and what is known as the Blight-Proof pear.

The magnolia fig continues to be a hardy grower and a prolific producer, but the apex bears an opening which causes it to become sour before ripening.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

The North Louisiana **Agricultural Society held** its monthly meetings on the grounds of the Experiment Station during the year and the Station staff frequently took part in the programs and assisted in getting speakers for the gatherings.

The twenty-fourth annual fair of the North Louisiana Agricultural Society was held upon the grounds of the Experiment Station on October 25, 26, and 27. The various exhibits were up to their usual standard.

THE RICE EXPERIMENT STATION, CROWLEY.

F. C. QUEREAU, Assistant Director.

Conducted in Co-operation with the Bureau of Plant Industry, United States Department of Agriculture.

All experiments mentioned in last year's report were continued in 1916.

FERTILIZER EXPERIMENTS.

These experiments, covering 19 quarter-acre plots, were continued. In these experiments the same kind and amount of commercial fertilizer has been applied to the land each year since 1910, and the plots planted in rice continuously. It is believed that sufficient data has been gathered during the past seven years to warrant discontinuing experiments which involve the continuous use of commercial fertilizer in an attempt to force land to grow rice year after year without rest or crop rotation.

It may be stated briefly that on all plots in which available phosphate was used five profitable crops of rice were grown. The highest yield was 28 barrels per acre. The two last crops were not profitable, the yield being considerably less than the checks. This is due to the heavy growth of water grasses which seem to thrive on land fertilized with acid phosphate. The water crab grass and the barn-yard millet or foxtail grass, as it is sometimes called, seem to make the heaviest growth.

Profitable yields were obtained the first year in the experiments with potash. Since the first year the yield has been but little more than the checks. There are no water grasses in the potash plots or in the checks.

Cotton seed meal or manure seems to be profitable when applied to Honduras rice. The increase in yield is not so marked in the case of Shinriki or Blue Rose.

ROTATION EXPERIMENTS.

The rice during this year was very good on all of these experiments, the average yield being 16.5 barrels. The corn yield was very poor. A very good crop of cowpeas was produced. From the results obtained it is believed that the long rotation is better than the two or three and four-year rotation. The longer the rotation the greater the interest on money invested in drainage ditches in the case of high-land crops and in the levees in the case of rice.

INSECTS AND DISEASES.

Oil experiments have been continued with the idea of preventing damage from the root maggot or the larvae of the Lissorhopterus Simplex. From the experiments on the Station and on surrounding farms where oil has been used it is believed that 15 gallons will increase the yield from 25 to 40 per cent. Forty gallons of crude oil have been used on a single acre without injury to the rice. Oil does not injure rice, if the leaves are not resting on the surface of the water. If the land is drained and allowed to become dry fifteen days after the initial irrigation the damage of the maggot is largely prevented.

Continued experiments seem to indicate that if irrigation is delayed or if the land is drained and allowed to become dry during the growing season there is little if any danger of "straight head." Straight head "disease" seems to occur on land containing a large amount of vegetable matter. The cause of straight head is not known.

PIRICULARIA

Or the Rotten Neck disease does not seem to attack the commercial varieties of rice now being grown in Louisiana to any great extent. The principal remedy for this disease seems to be selection of varieties which are known to be largely immune to the disease.

MISCELLANEOUS CROPS.

The following were planted this year: Sorghum and peas for soiling; sudan grass, three varieties of velvet beans, two varieties of soy beans, mungo beans, broom corn, teosinte, two varieties of peanuts, three varieties of sweet corn, pop corn, two varieties of millet, kafir corn, Mexican beans, alfalfa, oats, red clover, alsike, crimson clover, garlic, and sweet potatoes. Following are those deserving special mention:

GREEN MUNGO BEANS.

This bean made a very heavy growth of vine, with the exception of the velvet bean it made the heaviest growth of any legume at the Station. It would not be as difficult to harvest as the cow pea. The yield of seed is very small.

It is believed that it would be cheaper to import the seed from the Islands of China than to attempt to save the seed produced in this country.

THE BILOXY SOY BEAN.

This seems to be the best bean that we have yet tested at the Rice Station. It makes a heavy yield of threshed beans on ordinary rice land; the pods do not open readily when the stalk is cut and becomes dry. It is possible to harvest and thresh this variety of soy bean with a very small loss from shelled beans. It makes the heaviest yield of any soy bean that has been grown at the Station.

VELVET BEANS.

The Reuter 90-day bean produced the heaviest growth of vine and harvested beans of the three varieties tested this year.

GARLIC.

This seems to be a winter crop of promise for rice land. A yield of 2000 pounds per acre was secured this year. It was planted on ordinary rice land, with 200 pounds per acre of equal parts acid phosphate and cotton seed meal.

CLOVERS.

The results are very poor. The seed was inoculated with farmogerm and the land limed 2000 pounds per acre. Red clover grew about six inches high. The alfalfa made a very poor growth and at least 50 per cent of the stand was destroyed during the summer.

JAPANESE CANE.

This produced a yield of 16.8 tons per acre.

TEOSINTE.

Teosinte produced a yield of 26.9 tons per acre.

SORGHUM AND PEAS (FOR SILAGE).

These produced a yield of 12.85 tons per acre.

SUDAN GRASS.

Sudan grass produced three cuttings during the season; yield per cutting was about 2200 pounds per acre.

CORN VARIETY EXPERIMENT.

Sixteen varieties of corn were planted. There were two rows 210 feet long in each variety. The results were very poor. This was due to the stalk borer and bud worm.

OATS.

Oats made the poorest crop ever produced at this Station. This was due largely to rust.

WORK OF THE U. S. B. P. I.

The experiments of this department are largely devoted to variety work in rice and experiments with irrigation of rice, and to experiments with rice diseases. They have fifteen varieties of rice which are of great promise. This year there were over 3000 varieties planted on the Station.

EXPERIMENTS ON RECLAIMED LAND AT FLORENCE, LA.

Ten half-acre plots and ten 0.7-acre plots were laid out on the Alley Farm, at Florence, La. This work was done on reclaimed land in co-operation with the White Lake Land Company. Ten half-acre plots were devoted to fertilizer experiments with corn. Ten 0.7 acre plots were devoted to fertilizer experiments with rice. About two acres were planted to miscellaneous crops, including sixteen varieties of corn.

The results were striking. The unfertilized checks in the corn experiment made 1.12 bushels per acre; where the phosphate was used the wield was 13 bushels per acre. In both the rice and corn experiments 200 pounds of 16 per cent acid phosphate seemed to produce the best results. Lime does not seem to increase the yield of land of this kind.

HORTICULTURAL DEPARTMENT.

G. L. TIEBOUT.

In the Horticultural Department investigations and demonstrations in the production, shipment and marketing of new truck crops for this section have been continued. Brussels sprouts, winter cauliflower and bell peppers have received special attention.

Brussels sprouts have been successfully produced and marketed, and are being grown by truckers for the first time this season. It has also been found that bell peppers can be cultivated and sold at the North to good advantage, and more extensive plantings among growers are recommended. Preliminary investigations with broccoli are under way.

MECHANICAL ENGINEERING DEPARTMENT.

This department was conducted along lines previously indicated, until October 1, 1916, when Prof. Kerr resigned to accept a position elsewhere. The results of the work on the different projects under this department were published in Bulletins 158, 159, 160.

1b

THIRTIETH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

---

FOR 1917

TO THE GOVERNOR

By W. R. DODSON, Director

Ramires-Jones Printing Co., Baton Rouge

Louisiana State University and
A. & M College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO

GOVERNOR RUFFIN G. PLEASANT, President.
I. D. WALL, Vice-President Board of Supervisors.
HARRY D. WILSON, Commissioner of Agriculture and Immigration.
THOS. D. BOYD, President State University.
W. R. DODSON, Director Experiment Station.

STATION STAFF

W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
A. P. KERR, M. S., Assistant Director, Baton Rouge.
C. E. HESTER, B. S., Assistant Director, Calhoun.
J. M. JENKINS, B. S., Superintendent of Rice Station, Crowley.
W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterenarian, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Assistant Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
F. V. EMERSON, Ph. D., in charge of Soil Survey Work, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
N. KOPELOFF, Ph. D., Bacteriologist, Audubon Park, New Orleans.
F. W. ZERBAN, Ph. D., Chemist, Audubon Park, New Orleans.
G. D. CAIN, B. S., Chemist, in charge of Fertilizer and Feedstuffs Laboratory, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
W. P. DENSON, B. S., Assistant Chemist, Baton Rouge.
J. H. JOLLY, B. S., Assistant Chemist, Baton Rouge.
S. S. WALKER, M. S., Soil Chemist, Baton Rouge.
MISS MAYME DWORAK, M. A., Scientific Assistant in charge of Seed Laboratory, detailed by United States Department of Agriculture, Baton Rouge.
MRS. EDITH STRONG, Secretary to the Director, Baton Rouge.
J. K. McHUGH, Clerk and Stenographer, Audubon Park, New Orleans.
R. P. SWIRE, A. B., Treasurer, Baton Rouge.
R. C. CALLOWAY, B. S., in charge of Dairy, Baton Rouge.
J. A. WEDGEWORTH, Mailing Secretary, Baton Rouge.

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

OFFICE OF EXPERIMENT STATIONS,

Baton Rouge, January, 1918.

To His Excellency, Ruffin G. Pleasant,
Governor of Louisiana:

Sir—I am pleased to submit herewith the annual report of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the year 1917. As required by act of the National Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional funds for research work at the experiment stations of the several states, a financial statement is submitted for the year beginning July 1, 1916, and ending June 30, 1917.

FINANCIAL STATEMENT.

The state appropriation for the experiment stations is kept in a separate account from that of the federal funds, as will be shown by the complete financial statement submitted herewith.

HATCH AND ADAMS FUNDS.

Dr.	Hatch Fund	Adams Fund
To receipt from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1917, under Acts of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)	$15,000.00	$15,000.00
Cr.		
By salaries	$ 7,464.88	$10,814.26
Labor	2,474.82	438.70
Publications	1,183.66	.....
Postage and stationery	23.51	30.28
Freight and express	100.67	28.38
Heat, light and water and power	16.08	165.32
Chemicals and laboratory supplies	....	152.53
Seeds, plants and sundry supplies	275.07	254.89
Fertilizers	32.00	.....
Feeding stuffs	2,354.49	632.90
Library	28.97	72.08
Tools, machinery and appliances	269.84	65.50
Furniture and fixtures	59.74	542.45
Scientific apparatus and specimens	....	862.07
Live stock	....	43.60
Traveling expenses	....	149.75
Contingent expenses	20.00	.....
Buildings and land	696.27	747.29

STATE FUND.

Statement of receipts and expenditures of the State Fund from December 1, 1916, to November 30, 1917:

Receipts:		
State Treasurer	$24,500.00	
Miscellaneous sales	12,107.59	
Refunds	1,141.23	
Interest on daily balance	197.34	$37,946.16

Expenditures:

Salaries	$ 9,695.86	
Labor	7,227.10	
Postage and stationery	443.09	
Freight and express	458.36	
Heat, water and light	392.39	
Chemicals	56.59	
Seeds and sundries	3,184.17	
Fertilizers	432.75	
Feeds	1,770.75	
Library	66.03	
Tools, implements and machinery	1,385.86	
Furniture and fixtures	209.33	
Scientific apparatus	81.16	
Live stock	4,164.12	
Traveling expenses	1,580.30	
Contingent expenses	3,292.14	
Buildings and repairs	643.37	
Deficit	2,807.94	
Publications	54.85	—$37,946.16

FERTILIZER FUND.

Statement of the Fertilizer and Feed Stuffs Funds from June 1, 1916, to November 30, 1917:

Receipts:

Commissioner of Agriculture	$21,703.29	
Refunds	177.00	
Deficit	886.11	—$22,766.40

Expenditures:

Salaries	$11,771.51	
Labor	1,145.90	
Postage and stationery	415.21	
Freight and express	144.39	
Heat, water and light	1,068.19	
Chemicals	2,016.88	
Seeds and sundries	261.94	
Library	37.05	
Tools, implements and machinery	63.72	
Furniture and fixtures	205.30	
Scientific apparatus	1,641.77	
Live stock	1,163.40	
Traveling expenses	553.70	
Contingent expenses	87.74	
Buildings and repairs	1,741.62	
Publications	29.00	
Old deficit	419.05	—$22,766.40

ADMINISTRATION.

I have continued to act as Dean of the College of Agriculture and Director of the Agricultural Extension work up to July 1, 1917, at which date Mr. W. R. Perkins was appointed to relieve me as Director of Agricultural Extension. I have also served as a member of the committee of three directing officials for the Live Stock Extension Service conducted by the United States Department of Agriculture in cooperation with the Louisiana State University.

FERTILIZER AND FEED STUFFS LABORATORY.

During the past season the laboratory analyzed 3,820 samples of feed stuffs and 2,651 samples of fertilizers for the State Board of Agriculture and Immigration.

The following chemists have resigned and are now engaged in war work:

R. G. Scott is now a lieutenant in the army.

Sam Byall is now a student in the Third Officers Training Camp.

J. M. Jennings is engaged in chemical work at a Government laboratory.

FIELD WORK.

The field work of the Sugar Experiment Station was conducted along lines which have been previously outlined. Weather conditions during spring and summer were adverse to crop growth and disastrous to some experiments. The average rainfall at this station for past fifteen years was 65.59 inches; the annual rainfall for 1917 was 32.27 inches, or less than half of an average for one year. Serious drouths occurred in the early spring, again from April 5 to July 3, and once more from the middle of that same month to latter part of August. This lack of water very seriously affected fertilizer experiments on sugar cane.

SUGAR CANE WORK.

A number of new seedlings were secured and planted to the nursery rows. Of the older varieties that have been under test for two or more years, L-511 continues to be the most promising. First year stubble from this variety came up early, stooled well, and, comparatively, grew well. In the early days of the past sugar campaign this variety, from analysis, should have yielded in the sugar house fifty-six per cent more sugar than the standard varieties now growing on the ordinary plantation. Demands for seed cane of this variety were, as usual, heavy, and were filled as far as possible. A good number of those canes that were promising in 1916 again showed good qualities, and all such canes were planted in larger quantities.

COVER CROPS ON FALL PLANT CANE.

Both Crimson clover and Mellilotus indica were used on fall plant cane. A good growth of both was secured by March 15. Yields from the plat on which Crimson clover was grown were double that on which no clover was grown. The rows on which Mellilotus was grown were alongside a ditch, and this cane suffered from lack of water. All soil in which the cover crops had been incorporated worked easier and remained in a better state of tilth than the check plats.

Cane on which nitrogenous materials were experimented with, suffering from lack of rain, did not come up to a stand, and the resulting yields were too much influenced by this factor to be of value.

CORN.

Unusually good yields of corn from the new white flint variety were secured.

Of the well-known ''prolific'' varieties of corn, those that are considered most promising for South Louisiana were tested against Yellow Creole and Calhoun Red Cob. Mosby's Prolific yielded about as well as Yellow Creole and slightly better than Calhoun Red Cob.

The work of improving Yellow Creole corn was continued, and a crop was grown that averaged close to two ears per stalk, and yielded fifty bushels per acre.

An opportunity presented itself for a comparison of corn grown after sugar cane in the ordinary three-year rotation, and corn grown after six years of alfalfa. Corn grown after sugar cane gave a yield of 38.3 bushels per acre, whereas corn grown after alfalfafa yielded 71 bushels.

The residual effect of potash which had been applied to two crops of sugar cane (1914-15) on a following crop of corn was tried without effect. All work with alfalfa, clover and other legumes was continued. An extraordinarily late freeze (March) severely damaged clover and alfalfa. The Barchest bean grew exceedingly well where it was planted in rows and cultivated, but poorly where planted broadcast in corn at the time of layby. Very few beans matured in either case.

FIELD DAY.

The tenth annual field day of the Louisiana Sugar Planters' Association was held on the station ground on June 14 and was, admittedly, the most successful in the history of these annual gatherings.

CHANGES IN STATION STAFF.

Mr. W. L. Owen, in charge of the Department of Bacteriology, resigned, and has been succeeded by Dr. Nicholas Kopeloff. Dr. Max Schneller, chemist in charge of the research laboratory, also resigned, and has been succeeded by Dr. F. W. Zerban. Mr. C. J. Barrilleaux, farm manager, resigned to accept a position in Trinidad, P. W. I., and was succeeded by Mr. E. J. O'Dowd, and Mr. O'Dowd lately resigned to enter college.

ENTOMOLOGICAL WORK.

The Bureau of Entomology, United States Department of Agriculture, continues to cooperate with the Sugar Experiment Station. During the year, work on the life-history of the pseudo coccus calceolariae was continued, and control experiments were carried through. It was definitely proved that the control of the Argentine ant will eliminate the pseudo cocus as a serious cane pest. Further work was done to demonstrate the efficacy of slow poison to control the Argentine ant. The heavy infestation of cottony cushion scale in New Orleans was brought under control by combating it with the Australian lady-beetle (Vedalia cardinalis). The Federal, State and city governments contributed to a fund for this work.

The effort to secure parasitic control of the cane moth borer was continued. New parasites were secured and tried without success. Cooperative experiments with sugar planters, along this line, were made and some good results obtained.

RESEARCH CHEMICAL DEPARTMENT

DR. F. W. ZERBAN.

PROJECT No. 1.

Investigations on the Sulphitation Process.

The study of the coloring matters in cane products and of methods for their elimination was continued during the past year. Special attention was paid to the preparation of efficient decolorizers particularly vegetable decolorizing carbons. It was found that natural vegetable substances, in order to furnish highly active carbons, should either contain large amounts of infusion ash—viz., lime salt, or phosphates, or silica—or else should first be impregnated with such or similar substances. They serve as a skeleton on which the carbon particles are deposited in a very finely divided state. The high decolorizing effect of the resulting carbon only appears after the impregnating substances have been removed by means of suitable solvants.

Very active carbons from natural sources were prepared, for instance, by charring the highly silicious parts of certain grasses, like rice hulls or leaves, barley awns, etc., heating the char to high temperatures in the absence of air, and dissolving out the silica by boiling with caustic soda, preferably under pressure. The resulting carbons were as good or better than Norit.

As regards artificial impregnation methods, highly active carbons were made from ordinary pine or other sawdusts by charring them in a mixture with lime, acetate of lime, lime and phosphoric acid, etc. In these cases hydrochloric acid is used to remove the impregnating substance after thorough carbonization. Equal parts of pine sawdwust and lime gave a carbon superior to Norit. Very good results were obtained by using certain metallic chlorides as impregnating substances. Zinc chloride and stannous chloride were found very efficient in this respect, but the best carbon was made by means of anhydrous magnesium chloride, with which we were able to prepare a carbon fifteen times as effective as Norit.

A practical sugar house test in the refining of raw sugar by means of rice hull carbon was made in the summer, with satisfactory results from the standpoint of feasibility.

During the grinding season laboratory and sugar house experiments were carried out on cane juices and syrups with Norit and rice hull carbon. A bulletin on the results of these tests is now in preparation.

During the month of November we also collected raw material for a further study of the polyphenols of the cane, in the shape of cane tops and eyes, which have been suitably preserved and will be worked up later.

PROJECT No. 2.

The Molecular Rearrangement of the Reducing Sugars.

A satisfactory method for the determination of sucrose in the presence of reducing sugars by means of a lead-alkali has been worked out, and the results of this investigation will be published.

BACTERIOLOGICAL DEPARTMENT

*W. L. OWEN.

PROJECT No. 1.

A Study of the Deterioration of Sugars and Principal Factors Affecting Same.

Observations upon the changes in chemical composition of sugar samples revealed the fact that a solid non-sucrose moisture ratio 3:1 (known as the "Factor of Safety") does not invariably prevent a sugar from deteriorating and that there is a successive increase and decrease in reducing sugars of the same sample at different periods of storage. The effect of high temperatures and humidities upon sugar deterioration was studied. It was found that the number of micro-organisms per gram of sugar was no criterion for deterioration. In developing methods in this connection syrup dilution proved superior to water dilution for quantitive results. The power of each species isolated to destroy sucrose was determined and a wide variation obtained. Cultures which had been previously acclimatized to sugar proved to be most vigorous. The limit of sucrose concentration in which the cultures seem capable of inducing any appreciable action is between 45-55° Brix, and in general they have a low tolerance towards acid and alkali when grown in sucrose solution. The comparatively low maximum density in which these bacteria are capable of developing suggests that their deteriorative action upon sugars is largely confined to fairly moist sugars, in which the molasses films have been much diluted by the absorption of addition of moisture.

---

*Resigned. Succeeded by Dr. N. Kopeloff, Nov. 1, 1917.

In studying the influence of the density of the molasses film upon the deterioration of sugars, the general conclusion was established that there is no destruction where the moisture content of the sugar is not abnormal, emphasizing again the importance of this factor in the storage of sugar.

While investigating the comparative value of various culture media for the quantitive bacteriological analysis of sugars, it was found that the use of ordinary 10% sucrose agar prevented a very important group of micro-organisms in sugars from developing on the plates. The use of sucrose media of higher densities resulted in the isolation of a fairly large number of torula, most sugars containing a larger group of these micro-organisms than of bacteria. Seventeen species were isolated and described in detail. These organisms, however, exhibit a slight power of destruction of sucrose, levulose, or dextrose.

The fungi group, which appears to be the most important causative agent in deterioration, was isolated on a 50% sucrose agar at 34°C. Practically all of the species identified were Aspergilli, and were found to have a great destructive effect on sucrose, even at high concentrations. The limit was reached at 72° Brix. Torula when grown in association with molds decreased the effectiveness of the latter in the destruction of sucrose. There does not appear to be any symbiotic relationship between bacteria and torula. Molds alone proved more destructive than bacteria alone.

In observations on the limit of density for these micro-organisms it was found that the molds are capable of rapid deterioration in 69° Brix, while torula are only moderate at 64°, and bacteria are rapid at 52°, but not at 60°. Thus the fungi may be regarded as especially significant in sugar deterioration because of their activity at such high concentrations, which approximate the concentration of the moisture film surrounding the sugar crystals. The addition of nitrogen and ash nutriments does not markedly increase the activity of torula or bacteria and does not seem to have much effect on the keeping quality of sugar. It was found that the addition of impurities—i. e., compounds of calcium, etc.—reduced the destructive activity of the microorganisms because of the effect upon density. It was found that increasing the acidity of the molasses film does not appreciably extend the maximum limit of density at which the sucrose-destroying power of torula is suppressed. Molds are adapted to a wide range of reaction. An inverse ratio exists between the density of the molasses film and sugar deterioration.

The application of these results to actual practice is to be found in emphasizing the importance of maintaining the composition of the molasses film—that is, not permitting any dilution. Further, it is desirable to have a large and hard grain. The method of manufacturing sugar affects the solubility, hence the "Factor of Safety." The "Factor of Safety" holds good for unwashed 96° sugar, but varies with other kinds. Dry and cold storage is especially necessary in preventing sugar deterioration. Little benefit results from the practice of disinfecting sacks. Finally, the importance of fungi in sugar deterioration makes it imperative to investigate more extensively in that direction.

STATION No. 2, BATON ROUGE

A. P. KERR, Assistant Director.

The work of this station has been continued on about the same lines as previously outlined.

On account of drouths during the summer, the corn, sorghum, and soy bean silage project was discontinued for 1917. This left only the Japanese cane for a silage crop. It yielded 28 tons per acre.

FEEDING AND GRAZING STEERS.

For the steer feeding project, 20 steers were fed as usual for ninety days. A lot of 10 steers fed on palm kernel meal and Japanese cane silage made an average gain of 1.55 pounds a head a day, while the 10 steers which were given peanut meal and Japanese cane silage made an average gain of 1.19 pounds a head a day. These steers were placed on the market in New Orleans on June 14 and sold for an average of 10 cents per pound.

The grazing of steers on corn and velvet beans was carried out again during November and part of December. The steers looked to be in good condition in the feeding lot, yet the gains were very unsatisfactory.

HOG GRAZING CROPS.

The project to determine the effect of feed on bodies of hogs was carried out again this year. On account of the poor railroad facilities during the fall of the year, it was impossible to ship our grazing hogs to a packing house, and we could not follow them through and see how they killed out. They were sold on the open market in New Orleans. Therefore the results of last year, as to the effects of these feeds on the bodies of hogs, could not be compared with this year's results. However, another experiment was carried out on dry lot feeding to determine whether feeding hogs on peanut meal after the oil had been extracted would produce hard or soft hogs. A lot of 10 hogs were fed on a ration of palm kernel meal and corn chops and compared with a lot receiving a ration of peanut meal and corn chops. While the 10 hogs receiving the balanced ration of peanut meal and corn chops made better gains than the 10 hogs getting a ration of palm kernel meal and corn chops, the bodies of the hogs were not as firm; therefore, the class of meat was not as good.

A project for grazing hogs on corn and velvet beans was started, but it was impossible to get the hogs to eat the beans until they were dry. For this reason they consumed all the corn before they started eating the beans. They made fairly good gains, however, but not nearly what was expected. From this one year's results it would seem that corn and velvet beans is inferior to any other grazing crop that we have tried, such as velvet beans, peanuts, corn and sweet potatoes.

We carried on experiments, in cooperation with the Department of Agriculture, with regard to the variety tests of soy beans and cow peas, also with the selection of soy beans with high oil and protein content. The results have been tabulated and reported to the Bureau of Plant Industry, Washington.

Pulling suckers from corn has also been carried out again this year. The results confirmed the results of previous years, and, while the yield was a little higher when the suckers were removed, it was not enough to compensate for the labor involved.

FERTILIZING CORN.

The use of commercial fertilizer alone on corn has also been tried out again this year, and as the same results have been obtained for the last twenty-five years, this will be discontinued throughout the coming year. I think that this experiment proves conclusively that unless commercial fertilizer is used in connection with green crops and stable manure, it is unprofitable in this kind of soil.

We also made a test to determine whether or not potash alone was profitable in commercial fertilizer for corn. It matters not whether it is applied in the spring or fall, we could not see that it gave any material yields over using acid phosphate and cottonseed meal. We also tested out the yields of the following crops: cowpeas, velvet beans, and soy beans, harvesting one-half of the crop for hay, and turning under the other half. The first year's results have not shown that the yield will be increased where the vines of any of these crops are turned under over the yield where they have been cut for hay.

The two-year rotation has been carried on for several years, giving a fair yield of cotton, corn and oats, beginning with this year. It is impossible to compute the average results from this kind of experiment unless the figures of a long number of years are at hand.

The experiment with lespedeza this year was a complete failure on account of the dry weather and the lespedeza being killed before it was of any height.

DEPARTMENT OF PLANT PATHOLOGY

C. W. EDGERTON.

The work of the Department has proceeded along the same lines as in the previous year. There has been no change in the projects under investigation. On account of the campaign for an increased food production, however, there has been a heavy increase in the requests from over the state for information on various plant diseases and allied subjects. This has resulted in much heavier correspondence than in previous years. The force of the Department has also been short on account of the difficulty in obtaining men to take the places left vacant by those who have gone into the army or other government work.

The project on sugar cane diseases received considerable attention throughout the year. The investigations at Audubon Park to test out the effect of the Red Rot disease on the germination of cane were continued. Observations on the loss caused by Root Rot disease were also made. This disease was very severe in 1917, due probably to the dry season, and was responsible for much of the cane shortage.

The experiments on the tomato wilt were carried on as in previous years. These included studies of the life history of the organism causing the disease and the testing out and selection of hybrids resistant to the disease. An article on a seed bed method of selecting for wilt resistance was prepared and sent in to Phytopathology for publication. Some of the hybrids which have been selected for wilt resistance show considerable promise.

The wilt resistant cottons which have been selected during the past several years were tried out on a larger scale during 1917. Some of these produced as high as three quarters of a bale to the acre on badly infested land, the highest yield that has been obtained on the Station grounds for several years.

Investigations on the Eggplant Blight were mostly confined to spraying experiments. The spraying tests did not give any positive results. The very dry season resulting in a light infection of the disease may have been partly responsible for the results obtained.

Investigations on alfalfa diseases, Sclerotium wilt disease, and rice diseases were largely confined to field observations.

DEPARTMENT OF ANIMAL PATHOLOGY

HARRY MORRIS.

The work in the Department of Animal Pathology has been continued along the same lines as in previous years and includes a study of some of the most important animal diseases.

The final results of the study of the blood-sucking insects as transmitters of anthrax charbon are being published in Bulletin

163. This work should show the necessity of protecting animals from the ravages of blood-sucking insects during outbreaks of this disease, also a more strict observance on the part of the farmers of the rules and regulations of the State Live Stock Sanitary Board.

During the past year a number of commercial anthrax vaccines were purchased on the open market and tested in the laboratory. The results show the efficiency of the vaccines has been increased and that a better product is being put on the market than in past years. Greater protection against anthrax should be produced by the use of these vaccines with a decrease in the annual loss by live stock from this disease.

A number of other diseases of live stock have been studied and a large number of specimens have been received for examination.

The increased correspondence has been taken care of as in previous years by Dr. Dalrymple, head of the department.

The equipment of the department has been increased by the addition of a room to the animal house for the holding of post-mortem and general diagnostic work.

HORTICULTURAL DEPARTMENT

G. L. TIEBOUT.

Under a joint arrangement the horticulturist has continued his activities, both investigational and extension, through the Experiment Station and Extension Division. The work in the commercial production, shipping, and marketing of bell peppers was continued during the summer. Prices were very satisfactory, but the quality of the crop was very poor and the yield very low owing to the extremely dry weather. The cooperative shipping arrangements by freight that were conducted the year previous with growers at Denham Springs and other points were abandoned, as the high prices did not make this form of transportation attractive. The production of bell peppers among growers, especially at Denham Springs, has been very materially increased and we feel that our activities have helped bring this about.

The winter work with the production, shipping, and marketing of cauliflower and Brussels sprouts, and the variety tests of Broccoli was practically a failure due to the severe freezes and continuously cold weather.

The popular publications of this department giving results with truck crops have been issued in the form of mimeograph circulars. Ten have been written.

A great deal of attention has been given the war garden drive. Sixteen circulars have been prepared in this connection.

A four year course in gardening for the girls' canning clubs was prepared.

The horticulturist had charge of the collecting, shipping, and installing of the station exhibits at the State Fair and New Orleans Fair.

He has met demands for special addresses, cooperated with other departments in closely related work, and attended to the usual correspondence.

MECHANICAL ENGINEERING DEPARTMENT

A. GUELL, Mechanical Engineer.

The work of this department, which had been discontinued due to the resignation of Prof. E. W. Kerr, was restarted September, 1917. Responding to the appeal of the National Fuel Administration, and at the request of several owners of Louisiana sugar houses, this department has conducted investigations and has suggested changes in the equipment of twelve sugar factories which have resulted in the savings of hundreds of barrels of fuel oil during the 1917 grinding season. A bulletin will be issued embodying the results of these investigations. Two papers have been read before the Louisiana Sugar Planters' Association; articles have been written for the Louisiana Planter and El Mundo Azucarero. A large number of trips have been made to the sugar factories and two plants, much time has been devoted to the consultation at the University, and hundreds of letters have been written answering questions along engineering lines.

NORTH LOUISIANA EXPERIMENT STATION

CALHOUN, LA.

C. E. HESTER, Assistant Director.

The work at the North Louisiana Experiment Station for 1917 was conducted along lines similar to those of previous years.

Rotation experiments, variety and fertilizer tests with crops suited to this section; pork, beef, and fruit experiments have been continued. More hogs and cattle have been produced. Increased attention has been given experiments with soy beans and velvet beans.

The yields of the various crops during the year have not been satisfactory on account of the drouth. The results from fertilizer tests, etc., have been unsatisfactory on account of dry weather. In the experiments and general crops grown on the station during the year, there were produced about 475 bushels of corn, 21,000 pounds of seed cotton, 200 bushels of sweet potatoes, 18 tons of hay, and a good crop of velvet beans and cow peas.

RAW ROCK PHOSPHATE VS. ACID PHOSPHATE. IN A THREE-YEAR ROTATION.

In this experiment, one-third of the area is devoted to cotton, one-third to corn and a legume, and one-third to crimson clover followed by velvet beans. The velvet beans are plowed under in the fall with raw rock phosphate applied to one-half of plot at rate of 2700 pounds per acre. Each plot receives an application of raw rock phosphate every three years, while acid phosphate is applied to the cotton and corn crops at the rate of 300 pounds per acre.

The results show that the acid phosphate gave a slightly better yield in both cotton and corn than the raw rock phosphate.

CORN VARIETY TEST.

In the corn variety test, Sentell's White Dent, with a yield of 29.2 bushels per acre, led all other varieties. Hastings Prolific was second with 28.7 bushels and Gandy's Prolific third with 28.3 bushels. In percentage of grain, Rogers led with 88.2%, Calhoun Red Cob (Crumpton) second with 87.7%, and Calhoun Red Cob (supple) third with 87.3%.

CORN FERTILIZER EXPERIMENTS.

In the corn fertilizer experiments, the best yields (25 bu. per acre) were had from an application of 100 lbs. of acid phosphate and 100 lbs. of nitrate of soda per acre; and the poorest yield (10 bu. per acre) from an application of 300 pounds of acid phosphate alone per acre.

COTTON VARIETY TEST.

In the cotton variety test, Brown's No. 1, with a yield per acre of seed cotton of 1331 lbs. led the other varieties in yield. Its percentage of lint was 27.75. Cleveland's Big Boll, with a yield of 1326 lbs. of seed cotton, second. Its percentage of lint was 25.50. O'Bannon's No Chop (Drilled) with a yield of 1319 lbs. of seed cotton, was third. Its percentage of lint was 30.75.

In the percentage of lint cotton, Half and Half led with 37.50. Its yield of seed cotton was 1188 pounds. Money Maker with 35.50% was second. Its yield of seed cotton was 1211. Cook's Improved, with 35.00%, was third. Its yield of seed cotton was 1209 lbs.

COTTON FERTILIZER EXPERIMENTS.

In the cotton fertilizer experiments, the application of cottonseed meal at the rate of 100 lbs. per acre gave an increase of nearly 200 lbs. of seed cotton per acre in a three-year average. The application of 200, 300, and 400 lbs. of cottonseed meal gave a small increase over the 100 lb. application. Applications of acid phosphate at the rate of 100, 200, 300, and 400 lbs. per acre gave increases of from 136 to 212 lbs. of seed cotton per acre in a three-year average.

CORN AND VELVET BEAN EXPERIMENTS.

These experiments were planned with a view of ascertaining the best method of growing velvet beans with corn. The drouth killed many of the beans where planted among the corn, which accounts for such low yields in these plots. Early Speckled velvet beans were used in these tests.

Experiment 1.

Eight rows corn with velvet beans between each hill of corn on every row. Making eight rows corn and eight rows velvet beans to the experiment.

Yield corn: 18.8 bushels per acre.

Yield velvet beans: 360 pounds per acre.

Experiment 4.

A row of corn and a row of velvet beans alternated, making four rows corn and four rows velvet beans to the experiment.

Yield corn: 11.6 bushels per acre.

Yield velvet beans: 1200 pounds per acre.

The corn and velvet beans were planted in rows three and one-half feet apart. Corn and beans were fertilized with a mixture of two parts cotton seed meal and one part acid phosphate at the rate of 250 pounds per acre.

SWEET POTATO VARIETY TEST.

Variety	Yield Bushels per Acre
Triumph	190.3
Bunch Yam	175.0
Bunch Dooley	161.4
Nancy Hall	155.5
Southern Queen	155.5
Key West	154.9
Jersey Yellow	154.3
Running Dooley	137.8

The varieties in the above test were grown from slips or draws. They were grown on light gray, sandy loam soil and fertilized with a mixture of equal parts cotton seed meal and acid phosphate applied at the rate of 400 pounds per acre. The slips were set out on May 23.

SWEET POTATO VARIETY TEST.

Variety	Yield Bushels per Acre
Jersey Yellow	84.0
Nancy Hall	73.1
Bunch Yam	67.6
Triumph	42.0
Southern Queen	32.7
Key West	23.4

The varieties in the above test were grown from cuttings or vines. They were grown on same type of soil, fertilized and treated identically the same as the varieties grown from slips. The vines were set on July 11. The drouth during the summer materially injured the entire sweet potato crop.

PORK PRODUCTION EXPERIMENTS.

Good results were obtained from grazing shoats and sows on corn and soy beans, corn and peanuts, and corn and velvet beans.

BEEF CATTLE.

Calves sired by the shorthorn bull from native grade cows continue to do well. The herd of 16 cows, 1 bull, 4 heifers, 12 steers and 15 calves was successfully carried through the winter by feeding about eighty-four tons of corn and soy bean silage and one ton of cotton seed meal, with oat straw and cornstalks for roughage.

HORTICULTURAL WORK.

The one-acre vineyard, including half an acre each of Ives, Niagara, Concord, and Delaware grapes, produced its third crop this season. There was a decrease in yield from last year, which can probably be attributed to dry weather, and injuries inflicted by birds. The vineyard was sprayed at the proper time three times during the season. Quite a bit of rot was noticed, especially in the Delaware grapes.

The peach crop of the past season was very small, many trees bearing nothing at all. Considerable pruning and spraying have been done in an attempt to control the scale and other insects.

Practically the entire apple crop was destroyed by the blight.

The pears remaining in the orchard are too young to produce fruit and have not been attacked by blight.

The Magnolia fig produced a small crop of fruit, but it still possesses the large opening at apex that admits insects, causing the fruit to sour before sufficiently ripe to harvest.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

Monthly meetings of this Society were held during the past year. Station officials arranged the programs and entertained visitors during these meetings. The attendance was good and splendid interest was shown by those attending. The annual fair of the Society was dispensed with for this year and the efforts of the Society extended to aid in the organization of a larger and better fair at Monroe.

LOUISIANA STATE UNIVERSITY
LIBRARY

EXPERIMENT STATION DAIRY

The dairy experiments have been carried on as nearly as possible along lines previously planned. Some new experiments have been started which will require several months before they furnish data for definite conclusions.

A comparison of two dairy breeds—Jersey and Holstein—is being made with respect to the effect of climatic conditions, the cost of milk production, and the amount of care required.

An investigation of the value of velvet beans as a feed for dairy cows has been started recently. The objects of this investigation are (1) to ascertain the best and most practical method of feeding velvet beans, and (2) to determine their nutritive value as compared with some other dairy feeds.

An investigation on calf feeding is being carried on. Various rations are being tried with the purpose of (1) finding out the actual cost of raising a calf up to the age of six months, and (2) of determining what ration will give the largest gains at the least cost.

Good results in herd improvement have been attained during the past year. Several cows whose production is above the average were added to the herd. About twenty head, including both males and females, were sold during the year to farmers in different parts of the State.

THE RICE EXPERIMENT STATION

CROWLEY, LA.

F. C. QUEREAU, Assistant Director.

Conducted in coöperation with the Bureau of Plant Industry, United States Department of Agriculture.

FERTILIZER EXPERIMENTS.

The experiments which have been conducted in fertilizing rice lands may be summarized as follows:

1. Sixteen per cent acid phosphate at the rate of 200 pounds per acre seems to give the best results in the late varieties of rice, such as the Japans and some of the Wright varieties.

2. From these results it would seem that it is not profitable to grow rice longer than five or six years in succession through the use of phosphate fertilizer.

3. Phosphate acid seems to be the best fertilizer for all crops on reclaimed marsh land.

4. Nitrogen can be used to advantage on the early varieties, such as Honduras. Small applications of nitrogen may be of advantage on land that is in a badly run-down condition when planted to other varieties.

5. Potash does not seem to be required in the form of commercial fertilizer.

6. Most rice land needs vegetable matter.

7. Home mixed fertilizers are the most profitable.

ROTATION EXPERIMENTS.

Experiments have shown that long rotations are more profitable than short rotations in growing rice. This is not because the rotation crops do not make more profitable yields, but because of the high overhead expense necessitated by the frequent change from rice to highland crops. When highland crops are raised, deep ditches are necessary for drainage. Then when the land is again planted to rice, some of the ditches must be filled and the entire area leveed in contour.

ERADICATING RED RICE.

1. *Mowing the Stubbles.*—Mow the stubbles as soon as the rice is threshed. This will aid in germinating the red seed which may be on the surface of the ground. If the stubble is not too heavy on the ground, double-disc the land twice.

2. *Winter Cover Crops.*—It is believed that a winter cover crop is a great aid in the eradication of red rice. Red rice will become embedded in the soil and will not germinate until the soil covering is broken, admitting air and permitting the seed to sprout. The soil is filled with the roots of the winter crop. When these roots disintegrate in the spring, this aids in the germination of the red rice.

3. *Cultivated Crops.*—On land badly infested with red rice, preference should be given to clean cultivated crops until the red rice is under control.

STRAIGHT HEAD.

It is not known whether this is a disease or a condition brought about by physical causes. It seems to occur largely on land that grew a highland crop the previous year and which contains a large amount of vegetable matter.

From observations which have been made, straight head does not often occur on fields which some time during the growing season were drained and allowed to become dry. Again, it does not seem to occur on rice which is watered late and which may have apparently suffered to a certain extent from late flooding. Until more exact information is available it is considered to be safe practice on land which contains considerable vegetable matter to either irrigate late or drain the land and allow to become thoroughly dry once during the growing season. On land that has been in highland crops for several years it is advisable to follow this plan for the first two years that the land is planted to rice.

92
47

Middleton Library
Due Date

~~AUG 1 2008~~

~~JAN 2[illegible] 2009~~ C

LSU Libraries
3 1518 095 736 991